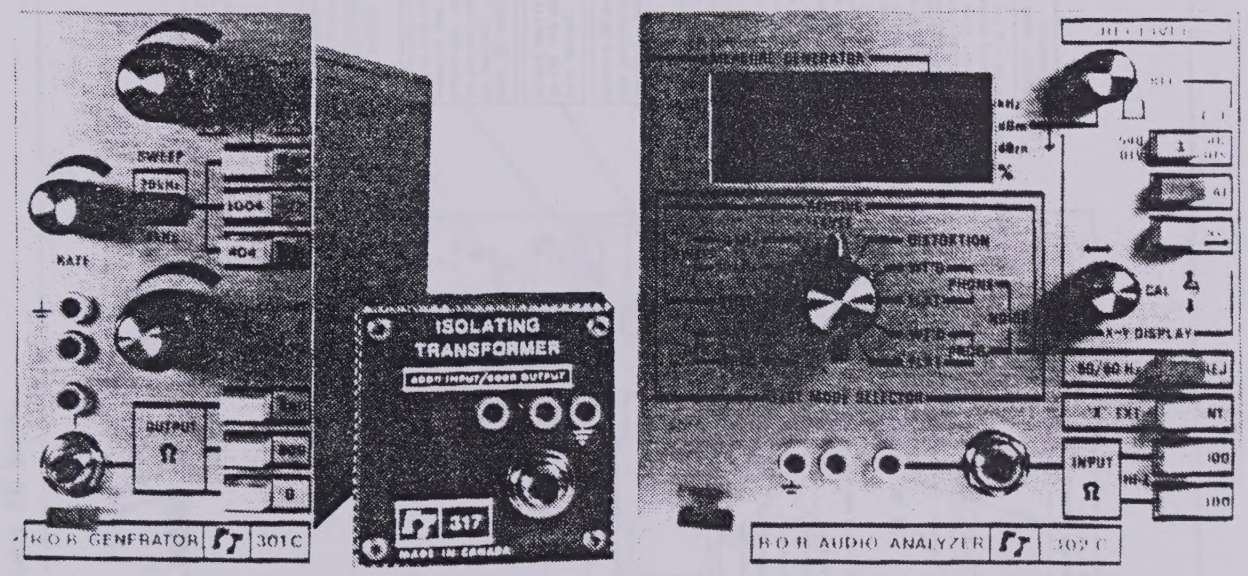
Consultronics

R-O-R
Type 300 Audio Analyser System

Service Manual

MP MASTER
MA23471



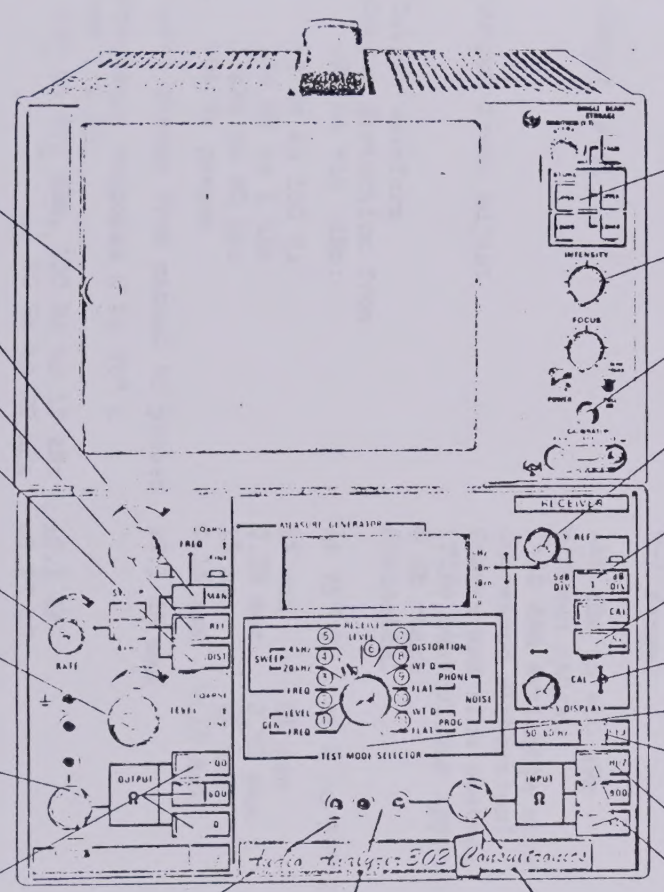
1.2.1 model 301 GENERATOR PLUG-IN

1.2.2 model 302 RECEIVER PLUG-IN

1.2.3 model 317 ISOLATING TRANSFORMER

Fig. 1.2 BASIC PLUG-IN UNITS for the R-O-R 300 SYSTEM

Operating Functions of the Basic 300 System



CALIBRATION POSITION
Press red CAL button and correct beam position.

Press MAN pushbutton for manual tuning of frequency. Read output frequency in position ① of Test Mode Selector.

Pushing the REF button will tune to 804 or 1004 Hz.

For distortion measurements use DIST pushbutton - generator will send special high purity test tone.

Release all three pushbuttons for automatic sweep of generator.

Select sweep rate from 2 sec/sweep to 100 sec/sweep.

Adjusts output level of generator between +18 and -40 dBm. Read output level in position ② of Test Mode Selector.

Transmit outputs are in parallel, balanced with grounded center. If connected to load where one side is grounded, output level is 3 dB lower than digital meter indication. Do NOT use both outputs at the same time (double termination!).

Select output impedance. 0 Ohm pushbutton permits the use of external resistor in series for output impedances other than offered.

Common Ground Jack

Left socket accepts banana plugs.

Receive inputs are in parallel and fully balanced. Dc current path provided.

Selects store/non store of CRT picture plus choice of upper and lower half screen storage and erase.

Adjust CRT picture, intensity setting approximately 1 o'clock.

Power Switch Pull = On
Push = Off

Shifts the displayed trace in the vertical direction. Use in order to center response trace on the CRT. Tied-in with ④ and ⑤.

Select amplitude scale on CRT (40 dB or 8 dB full scale).

Permits 5X expansion of any horizontal trace segment. Reposition trace ↔ for desired section.

Correct and calibrate trace position for left graticule circle on center line.

Hipass filter removes disturbing effects of 50 or 60 Hz mains frequency interference on level, noise or sweep measurements. Attenuation is >25 dB at 60 Hz, >0.2 dB at 300 Hz.

Bridging position > 50 K Ohms, with level meter reading voltage level 0 dB = 0.774 V.

Select input impedance.

The position of the TEST MODE SELECTOR switch determines what the instrument measures and indicates.

POSITION	FUNCTION
①	Digital readout shows send frequency (kHz), no trace on CRT.
②	Digital readout shows send level (dBm), no trace on CRT.
③	Digital readout shows frequency of received tone (kHz), trace display on 20 kHz log scale.
④	Trace display on 20 kHz log frequency scale, digital readout showing level of center line of CRT (dBm).
⑤	Trace display on 4 kHz linear frequency scale, digital readout showing level of center line on CRT (dBm).
⑥	Digital readout of received tone in dBm, trace display on 20 kHz log scale.
⑦	Digital readout of total distortion of one fixed test tone (404 Hz) in %.
⑧	Digital display of noise weighted with psophometric filter (CCITT White Book V, Rec. P53, 1968)
⑨	Digital display of noise (dBm) weighted with 3.5 kHz low pass filter.
⑩	Digital display of noise (dBm) weighted with Radio Program channel filter (new) CCITT Com.IV - No.76.
⑪	Digital display of noise (dBm) weighted with 20 kHz bandpass, IEC Publications 268-1 and 225.

Simultaneous display of any spurious tone on CRT, using 20 kHz log frequency scale.

300 System Audio Analyzers sold in North America contain the following noise filters:

⑧	Digital display of noise (dBm) weighted with C-message filter.
⑨	Digital display of noise (dBm) weighted with 3 kHz flat filter.
⑩	Digital display of noise (dBm) weighted with program channel filter.
⑪	Digital display of noise (dBm) weighted with 15 kHz flat filter.

(All filters in positions 8 to 11 comply with the Bell System Practices.)

600 Ω

(1004)

0 dB - 2 Vpp
3 dB - 2.80 Vpp
10 dB - 6.5 Vpp
15 dB - 12 Vpp
- 3 dB - 1.5
- 10 dB - .64
- 20 dB - .190
- 30 dB - 64 mV
- 40 dB - 20 mV

TECHNICAL SPECIFICATIONS & PERFORMANCE DATA

(Subject to Change Without Notice)

1.0 MODEL 301 AUDIO SWEEP GENERATOR PLUG-IN

Frequency range	40 Hz to 20 kHz min.
Frequency control	Manual or internal sweep
Preset frequencies	404 Hz (low distortion) & 1004 Hz
or	404 Hz (" ") & 804 Hz
Preset frequency tolerance at 25 °C	± 5 Hz
at 0 to 50° C	±10 Hz
long term drift	±10 Hz
Sweep rate	Adjustable from approx. 0.5 sec to 25 sec/decade.
Sweep range 1	40 Hz to 4 kHz min logarithmic
2	40 Hz to 20 kHz min "
Manual Frequency adjust	Coarse and fine control (fine control has approx. 2:1 range)
Output level	-40 dBm to +10 dBm minimum range. (+18 dBm available with increased distortion)
Output level adjust	Coarse and fine control (fine control has approx. 6 dB range)
Output waveform	Sinusoidal

Output distortion from -20 to +10 dBm:	at 25° C	at 0 to 50° C
40 Hz to 100 Hz	1% max	2% max
100 Hz to 1 kHz	0.3% max	0.6% max
1 kHz to 20 kHz	1% max	2% max
404 Hz preset	0.1% max	0.1% max

Level change from manual to preset	±0.1 dB max
Frequency response 0 to 50° C ref 1 k Hz:	
-30 to +10 dBm, 100 Hz to 10 kHz	±0.1 dB
" " , 40 Hz to 20 kHz	±0.25 dB
Output impedance at 1 kHz	600 ohm, balanced center gnd. Tolerance ± 1% 150 ohm, balanced center gnd. Tolerance ± 1% 0 ohm, balanced center gnd. Tolerance + 3 ohm.
Output connectors	WECO 310 & Siemens 3 pin

The model 301 Generator is designed to be plugged into a Tektronix 5111 oscilloscope mainframe.

TECHNICAL SPECIFICATIONS & PERFORMANCE DATA

(Subject to Change Without Notice)

MODEL 302 AUDIO ANALYZER PLUG-IN

Input Impedance ref. 1 kHz.	1.	150 ohm ±1% balanced.
	2.	600 " " "
	3.	100 kOhm "
Input holding current capability		70 mA DC max
Input overload protection		200 V 60 Hz AC 300 V DC 600 V 10 micro-sec. max
Input return loss		Over 30 dB to 6 kHz
Input connectors		Weco 310 & Siemens 3 pin
Audio monitor gain		+ 20 dB
Audio monitor output limit		+ 5 dBm
High-pass filter, switchable, Attenuation at 300 Hz 60 Hz		 less than 0.5 dB more than 25 dB

DIGITAL READOUT SPECIFICATIONS

Level measurements

Frequency range	40 Hz to 20 kHz
Level measuring range	-50 dBm to + 18 dBm minimum
Level readout resolution	0.1 dB

Level reading accuracy at 1 kHz (abs)

	at 25° C	0 to 50° C
+ 15 to + 18 dBm	± 0.5 dB	± 0.6 dB
+ 10 to + 15 "	± 0.25 "	± 0.3 "
- 20 to + 10 "	± 0.1 "	± 0.15 "
-35 to -20 "	± 0.15 "	± 0.2 "
-42 to -35 "	± 0.2 "	± 0.5 "
-50 to -42 "	± 0.3 "	± 1 +

Level reading flatness

Ref. 1 kHz, 25° C

	40 Hz to 100 Hz	to 10 kHz	to 20 kHz
+15 to +18 dBm	-0.2 dB	± 0.1 dB	-1 dB
+10 to +15 "	" "	± 0.05 "	± 0.2 "
-20 to +10 "	" "	" "	± 0.1 "
-35 to -20 "	" "	± 0.1 "	± 0.15 "
-42 to -35 "	" "	"	± 0.3 "
-50 to -42 "	-0.5 "	± 0.2 "	± 1. "

FREQUENCY MEASUREMENT (Gen or Receive)

Frequency Range	10 Hz to 20.00 kHz min.
Level range (ext. tracking)	-50 to +18 dBm min.
Resolution	10 Hz
Accuracy	± 5 Hz
Level range (int. tracking)	-30 dBm to +18 dBm min.

CRT DISPLAY SPECIFICATIONS (using Tektronix 5111 oscilloscope)

HORIZONTAL

Range 1. 2.	0 to 4 kHz, Linear 40 Hz to 20 kHz, Logarithmic
Display accuracy at 25° C 0 to 50° C	± 1 mm 100 Hz to 10 kHz ± 2 mm " " "
Expansion range	approx. 5:1
"X" Shift Control range	40 Hz to 22 kHz
Display calibration	Single pushbutton checks X & Y axis position and scaling

VERTICAL

Sensitivity	opt:	1 & 5 dB/division or 0.5 & 5 dB/division
"Y" Reference control range		approx. -40 to +18 dBm
Resolution		0.05 dB
Display accuracy		± 3% of deflection
Display Calibration:		Single push-button checks X & Y axis position and scaling.

The model 302 is designed to plug into a Tektronix 5111 mainframe.

C I R C U I T D E S C R I P T I O N

MODEL 301 GENERATOR

Generator Board

8.0 The generator consists of a voltage controlled oscillator (VCO) which produces a saw-tooth and a square waveform, a sine converter, a log sweep generator, a bandpass filter and a power output stage.

1) The VCO comprises IC's 5, 6, 7, 8 and part of IC 9 as well as Q1. When IC 5 output is positive, C 4 is charging towards the negative supply. When this charge reaches the same voltage as the output of IC 8 at the junction of R 22 and D 7 the comparator (IC 7) changes its output polarity. This reverses the voltage on the output of IC 5 reversing the direction of the saw-tooth signal on C 4 and changing the reference voltage on IC 8 until the charge once again reaches this level and then the cycle begins again. The VCO drive voltage at the output of IC 4 determines the speed of charge hence the frequency. This drive voltage comes from fixed or variable sources according to the selection on the function switch.

8.1 The sine converter processes the saw-tooth wave by performing the mathematical equivalent of the series expansion formula for a sine wave. IC 11, 12, 14, 15 and 16 convert the saw-tooth into a series of half sine waves. IC 17 and the second half of IC 9 invert every second half cycle to produce a proper sine wave.

8.2 The log sweep generator comprising IC 1, 2 and 3 is a self oscillating circuit, whose linear change of charge is converted by diode D 2 into a log -1 rate of change at the output of IC 2 which drives the VCO in the sweep position.

8.3 The bandpass filter (IC 18, 19 and 20) is tuned to 400 Hz. It provides a highly purified sinewave output for harmonic distortion measurements.

8.4 The power output stage of IC 21, 22, 23, 24 and 25 perform conversion of the single ended input signal to a balanced output level corrected for the selected impedance.

8.0 "X" BOARD

The terminated signal enters the receiver through a differential input stage consisting of IC 1, 2 and 3. From here the signal is split to further amplitude (V) processing by IC 6 and "X" decoding. This decoding is performed by converting the sinusoidal signal of varying amplitude to a square-wave signal of fixed amplitude by IC 4 and 5. This drives a one-shot comprising Q 1 and IC 13 whose output is integrated by IC 8 or IC 9 to a DC level proportional to input frequency. IC 10, 11 and 14 convert this linear output to a logarithmic drive which drives the CRT "X" deflection through IC 12. The presence or absence of a +15V level on LIN DRIVE determines if IC 12 follows the linear or logarithmic drive.

8.1 NOTCH BOARD

The notch board consists of a bank-reject filter and circuitry to selftune this filter to any frequency between 360 to 440 Hz and adjust the notch depth for maximum rejection. IC's 1, 2 and 3 form a inverting bandpass filter whose output cancels the out of phase fundamental frequency of the input tone in IC 5, leaving only the harmonics and noise IC 4 and Q 2 integrates tuning errors to drive the frequency adjusting photo coupler IC9. IC 6 and Q 1 integrates amplitude errors to drive the gain adjusting photo coupler IC 8. IC 7 is a semi-conducting 4 pole switch whose function is to select the proper signal for further processing.

8.2 FILTER BOARD

The filter board consists of a 40 dB gain stage, four active filters and a solid state 4 pole switch to select the desired output. IC 1 and 2 provide the 40 dB gain as well as the positive DC offset required by IC 12. The 3 kHz flat filter uses IC 3 and is shared by the "C" message filter comprising IC 3, 6, 8 and 10. The 15 kHz flat filter uses IC 5. IC 4, 7, 9 and 11 form the program channel filter.

8.3 "Y" BOARD

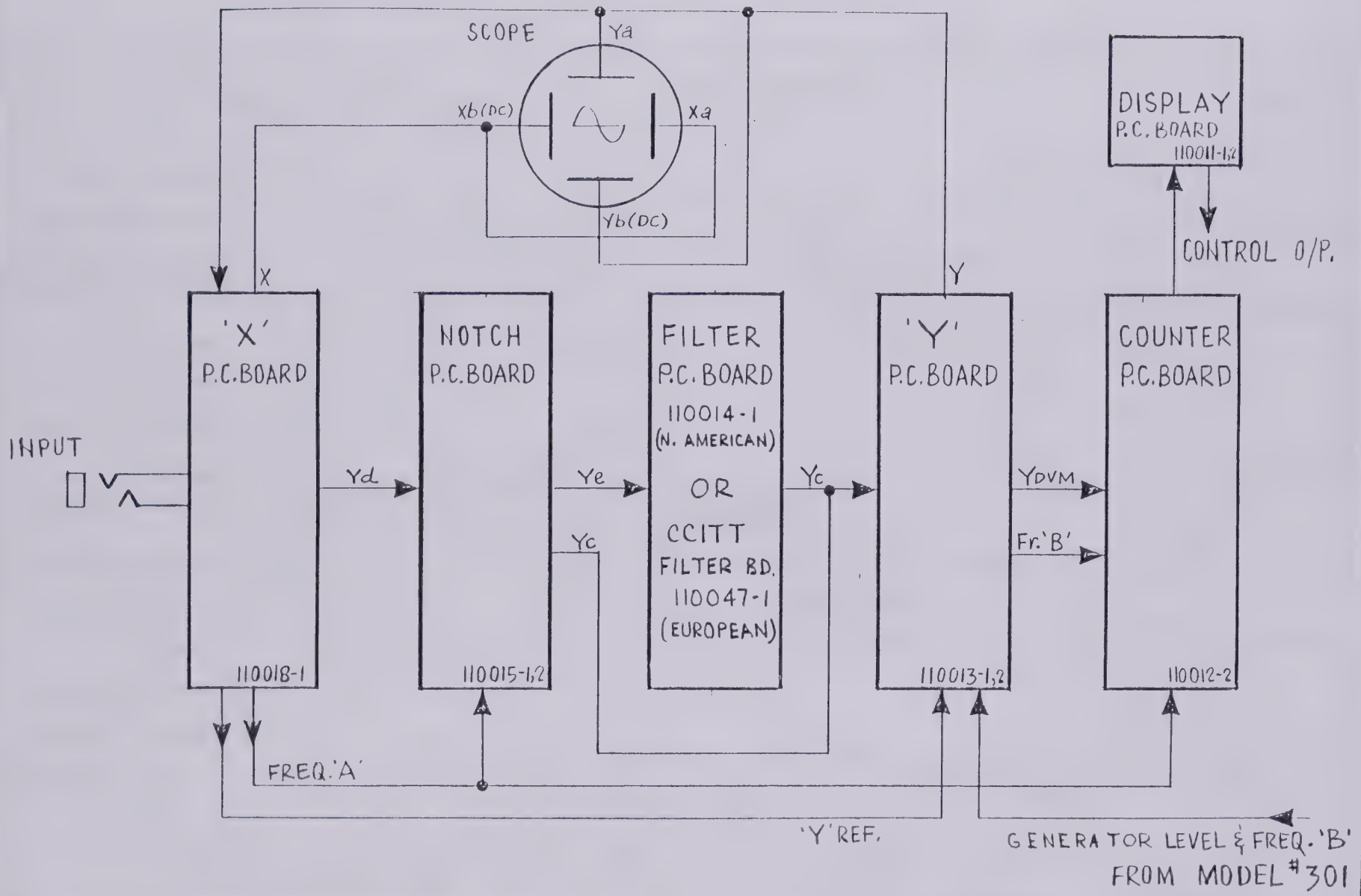
The "Y" board contains circuitry to rectify and filter the "Y" signal, take the logarithm of the result, calculate percentage distortion and electronically switch the proper output for driving the digital display. The "Y" board also contains the power supply regulators for all the boards in the Model 301 Receiver. IC 1 amplifies the AC signal to improve rectifier response IC 2 and 3 form a full wave rectifier circuit (average detector). After filtering the signal is applied to the log converter IC 4 and 14e. IC 7 and 14d supplies the reference 0 dB level. IC 5 amplifies the resulting level to IV/10 dB. IC 6 adds or subtracts the "Y" reference level from the dB signal level enabling the user to center the trace on the oscilloscope screen. When the trace is centered the "Y" reference voltage is equal to the signal level. This simplifies measuring of harmonic distortion as the signal is first "zeroed" with "Y" reference and then rejected by the notch filter. The ratio of the remaining harmonics to the stable "V" reference voltage is calculated by IC 8, 9 and 14c at IV/10%. IC 10, 11, 12 and 13 perform electronic switching. Only one of IC 10, 11 or 12 is allowed to amplify its input at one time. The others receive a positive input bias current reverse biasing their respective output coupling diodes. IC 10, 11 and 12 needed a positive offset and a voltage division by 2 to perform their function. IC 13 cancels the offset and re-amplifies the signal to the original level. Q 1 and D 20 regulate the positive supply to +14.5V. Q 2 and D 21 regulate the negative supply to -14.5V. D 19 is a temperature compensated zener diode which together with IC 15 and 16 produce a precision +1.00V and -1.00V supply.

8.4 THE COUNTER BOARD

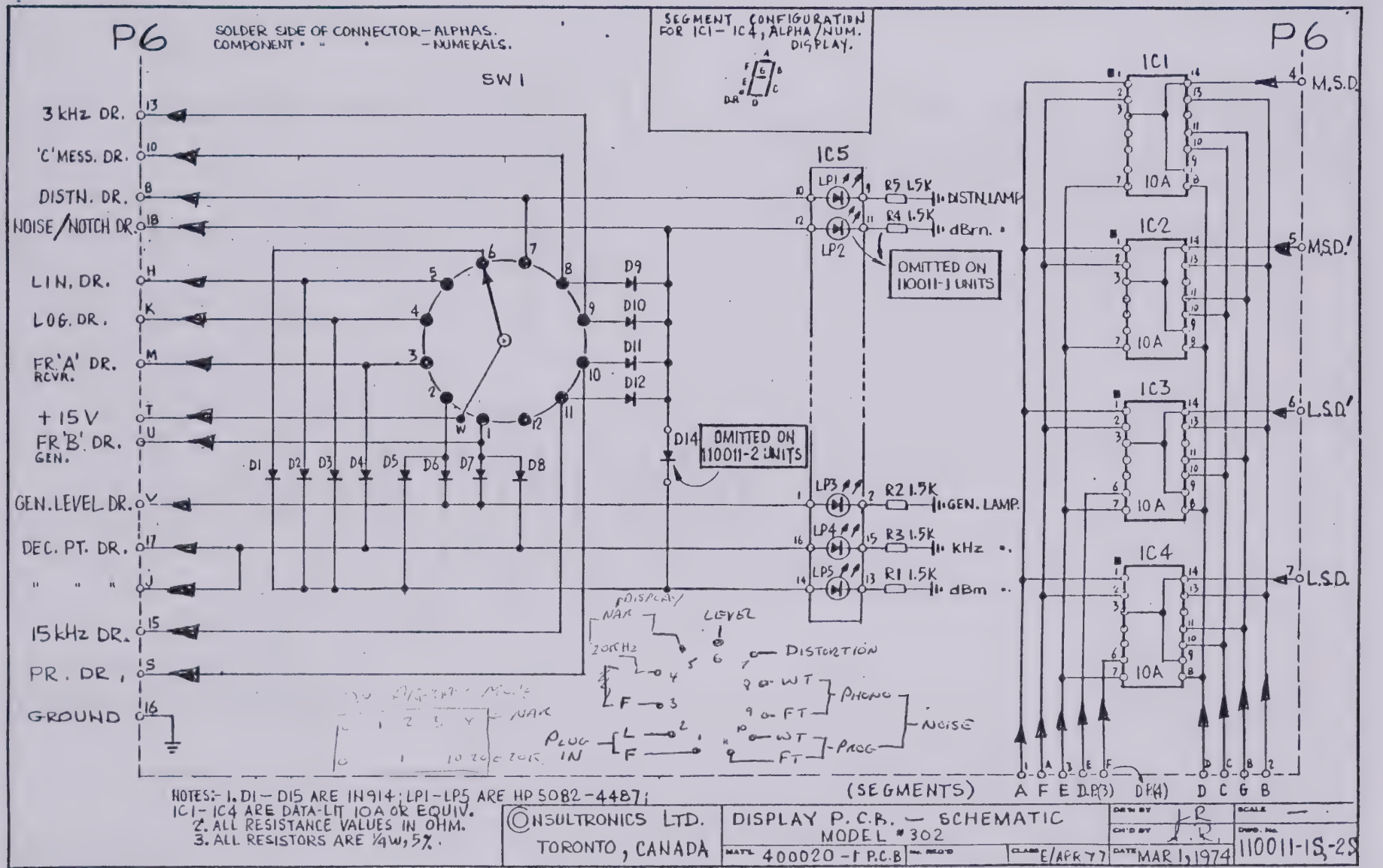
The counter board performs the function of analog to digital conversion, frequency counting and display driving.

IC 10 and 11 convert the incoming DC signal to its absolute value. If the input is positive Q 5 turns on and through IC's 8 d, 3 d and 5 prevent the display of a negative sign. The negative sign drive is taken from

the most significant digit (MSD) drive. IC 12 and IC 13 converts the DC input into a pulse train whose frequency is proportional to the input voltage. This pulse train or one of the frequency inputs can be selected by IC 3 and IC 9 to go to IC 4. IC 4 is a counter, seven segment display driver/scanner. The scanning frequency is generated with the aid of C 5. The counting interval of IC 4 is controlled by IC 1 which generates a 1.0 Hz. square wave from the division of a 1 MHz. crystal oscillator on the same chip. IC 2 further divides the 10 Hz. to 5 Hz., driving two one shots, one from the leading and one from the trailing edge of the square wave. The seven segment and digit drive outputs are amplified by IC's 5, 6 and 7 which drive the display digits from a +5V source.



CONSULTRONICS LTD. TORONTO, CANADA	BLOCK SCHEMATIC AUDIO ANALYZER (MODEL #302)	DR'N BY LR	SCALE —
		CH'D BY J.R.	DWG. No. 100021-1B
	MAT'L / No. REQ'D / CLASS	DATE MAR 7, 1974	

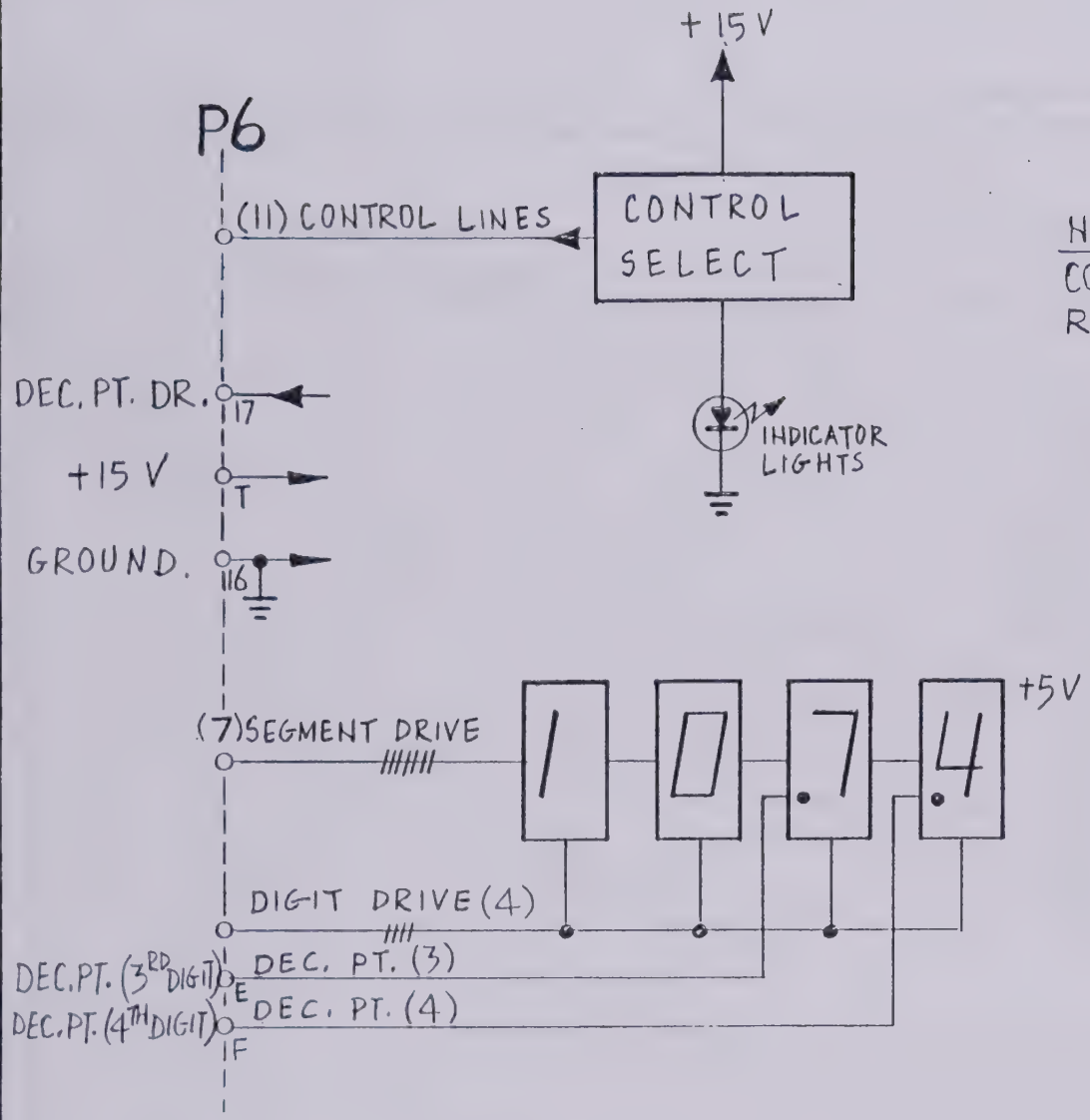


NOTES:- 1. D1 – D15 ARE IN914; LP1 – LP5 ARE HP 5082-4487; IC1 – IC4 ARE DATA-LIT 10A OR EQUIV.
2. ALL RESISTANCE VALUES IN OHM.
3. ALL RESISTORS ARE ¼W, 5%.

CONSULTRONICS LTD.
TORONTO, CANADA

DISPLAY P.C.B. – SCHEMATIC
MODEL #302

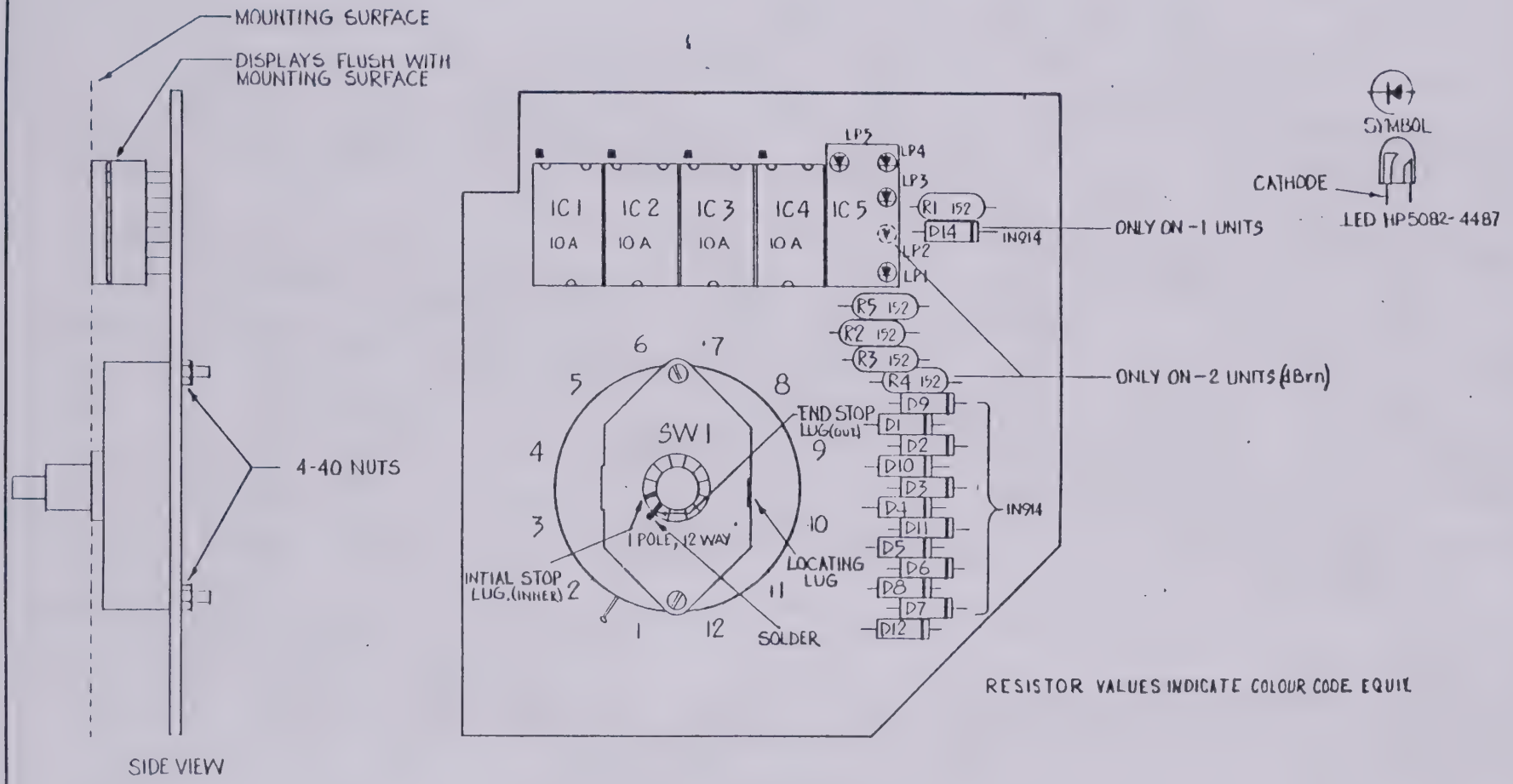
MATL 400020-1 P.C.B | CLASS E/APR 77 | DRN BY K.R. | CH'D BY K.R. | DATE MAR 1, 1974 | SCALE — | DWG. NO. 110011-1S-2S



NOTE:— FOR PIN ALLOCATION OF ALL CONTROL LINES, SEGMENT & DIGIT DRIVES REFER TO SCHEMATIC, DWG. NO 110011-1S

CONSULTRONICS LTD TORONTO, CANADA.	DISPLAY P.C.B. — BLOCK SCHEMATIC MODEL #302	DR'N BY L R	SCALE —
		CH'D BY A. R.	DWG. No. 110011-1B
	MAT'L / No. REQ'D / CLASS	DATE JAN 31, 1974	

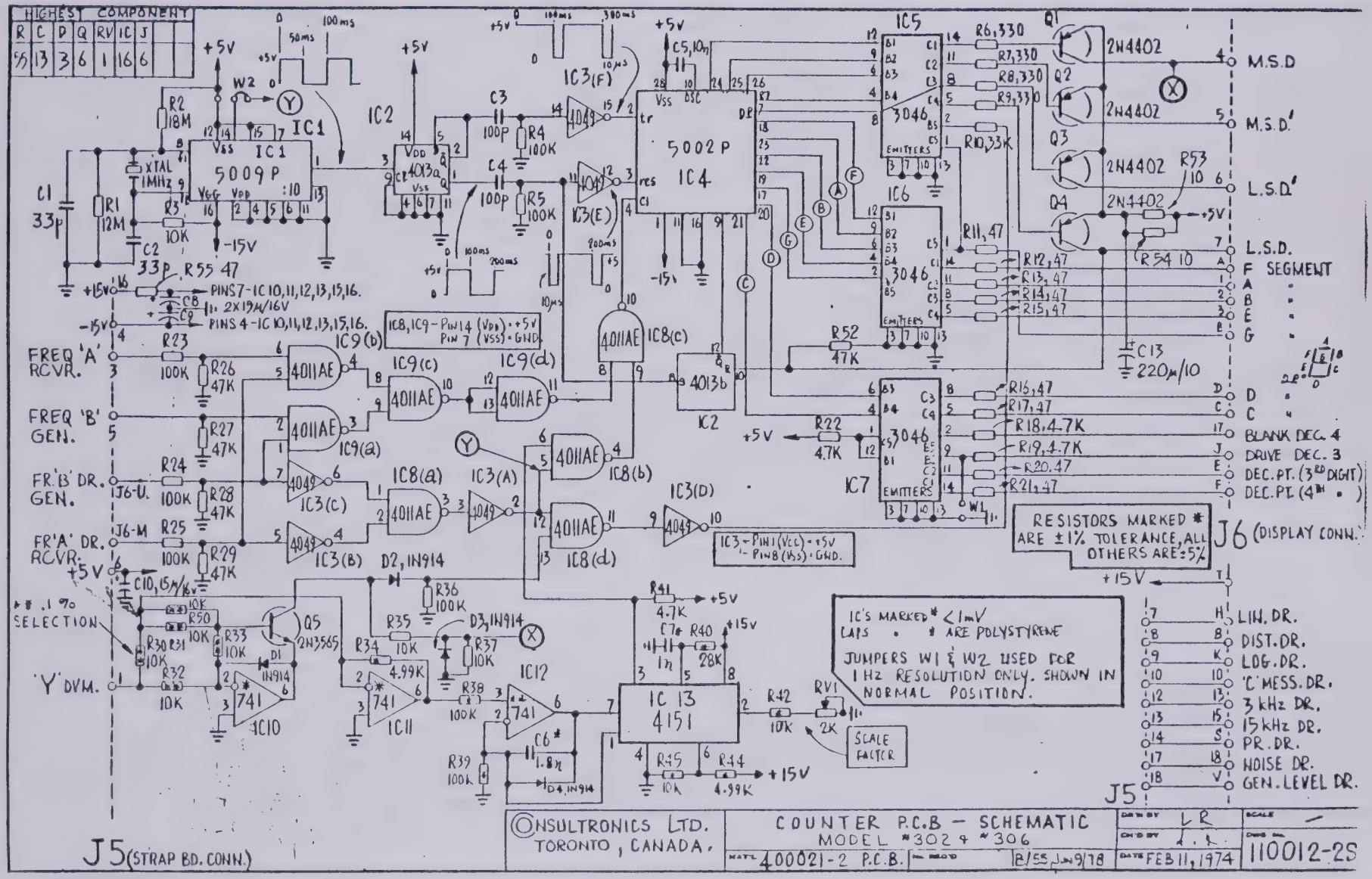
TRANSTEX 15 10M-9-73

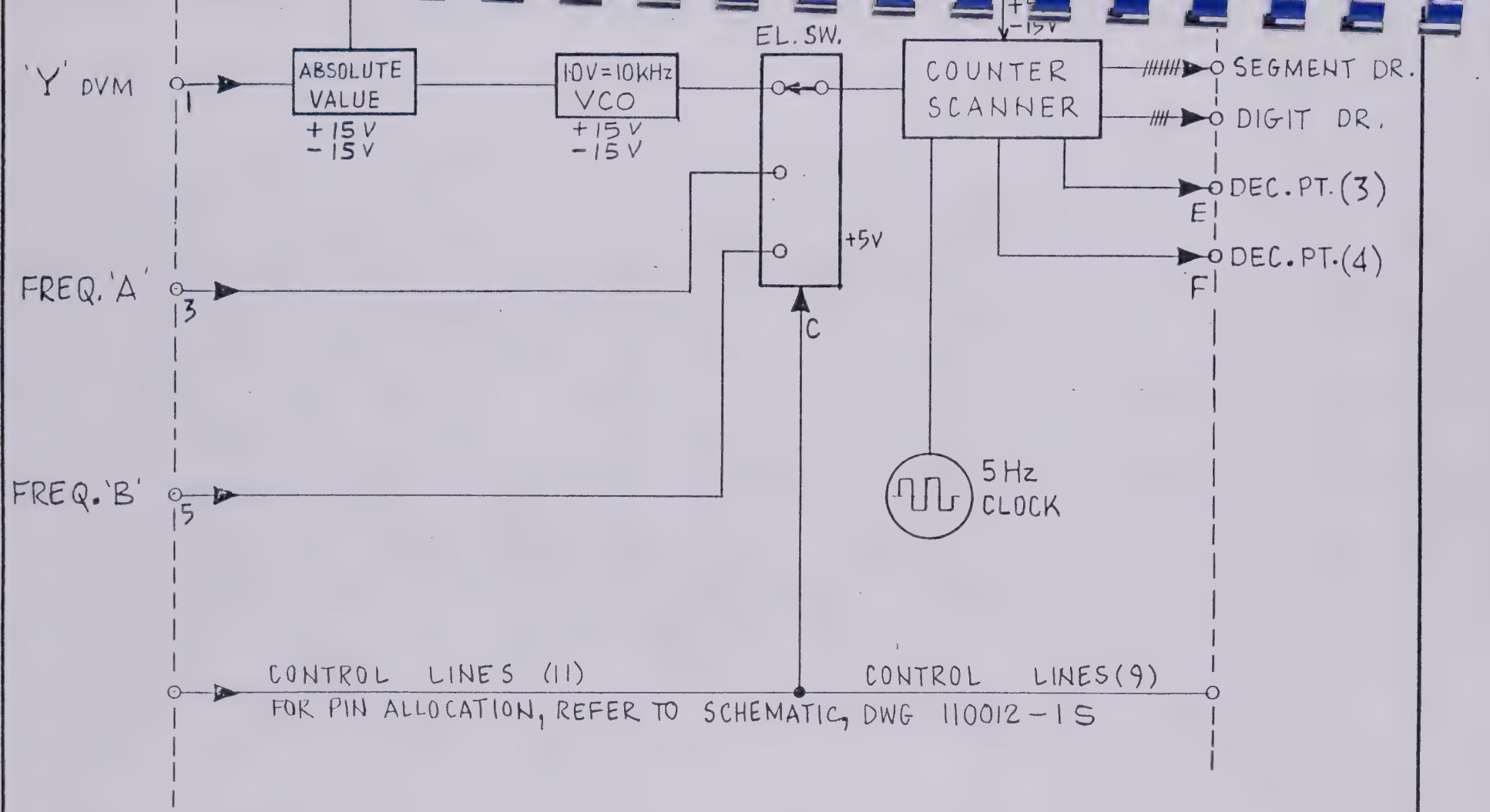


NOTE :-

1. SOLDER OUTER STOP LUG TO SWITCH PLATE TO RETAIN POSITION.

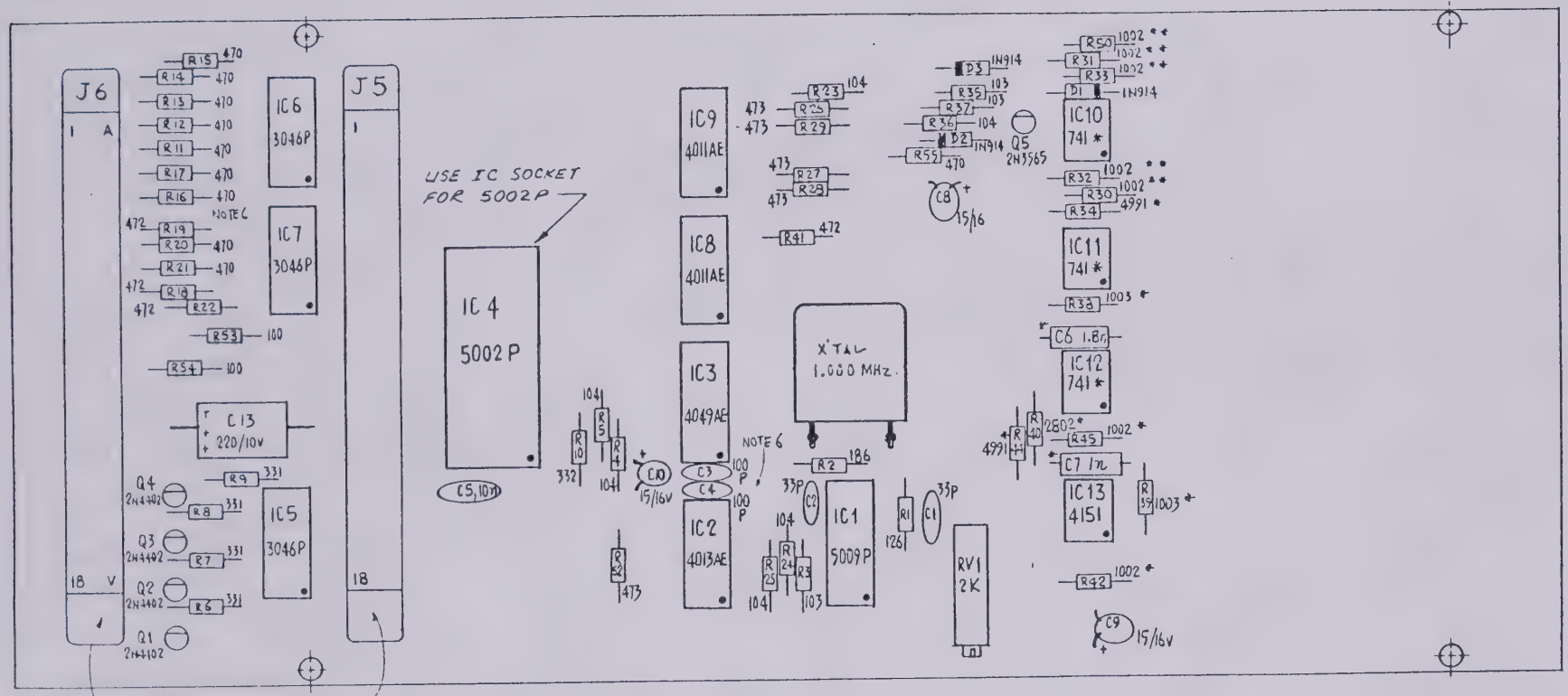
CONSULTRONICS LTD. TORONTO, CANADA.	DISPLAY P.C.B. SUB ASSY. MODEL # 302	DRN BY RR	SCALE 2:1
		CH'D BY	DWG. No. 110011-R2
	MATL P.C.B. 400020-1 / No. REQ'D / CLASS E/APR 77	DATE APRIL 17, 1975	


HIGHEST COMPONENT
R C D Q RV IC J
55 13 3 6 1 16 6
IC1 5009P
XTAL 1MHz
IC2 4013a
IC3(F) IC3(E) IC3(A) IC3(B) IC3(C) IC3(D) 4049
IC4 5002P
IC5 IC6 IC7 3046
IC8(a) IC8(b) IC8(c) IC8(d) 4011AE
IC9(a) IC9(b) IC9(c) IC9(d) 4011AE
IC2 4013b
IC10 IC11 IC12 741
IC 13 4151
Q1 Q2 Q3 Q4 2N4402
Q5 2N3565
D1 D2, IN914 D3, IN914 D4, IN914 IN914
W1 W2
C1 33p
C2 33p
C3 100P
C4 100P
C5, 10n
C6* 1.8n
C7* 1n
C8 C9 2X19μ/16V
C10, 15μ/16V
C13 220μ/10
R1 12M
R2 18M
R3 10K
R4 100K
R5 100K
R6, 330
R7, 330
R8, 330
R9, 330
R10, 33K
R11, 47
R12, 47
R13, 47
R14, 47
R15, 47
R16, 47
R17, 47
R18, 4.7K
R19, 4.7K
R20, 47
R21, 47
R22 4.7K
R23 100K
R24 100K
R25 100K
R26 47K
R27 47K
R28 47K
R29 47K
R30 R31 10K
R32 10K
R33 10K
R34 10K
R35 10K
R36 100K
R37 10K
R38 100K
R39 100K
R40 28K
R41 4.7K
R42 10K
R43 10K
R44 4.99K
R45 10K
R50 10K
R52 47K
R53 10
R54 10
R55 47
RV1 2K
SCALE FACTOR
+5V
-15V
+15V
FREQ 'A' RCVR.
FREQ 'B' GEN.
FR 'B' DR. GEN.
FR 'A' DR. RCVR.
'Y' DVM.
J6-U.
J6-M
PINS 7 - IC 10, 11, 12, 13, 15, 16.
PINS 4 - IC 10, 11, 12, 13, 15, 16.
IC8, IC9 - PIN 14 (VDD) • +5V
PIN 7 (VSS) • GND
IC3 - PIN 1 (VCC) • +5V
- PIN 8 (VSS) • GND.
* ±.1% SELECTION
IC'S MARKED * < 1mV
CAPS * ARE POLYSTYRENE
JUMPERS W1 & W2 USED FOR 1 Hz RESOLUTION ONLY. SHOWN IN NORMAL POSITION.
RESISTORS MARKED * ARE ±1% TOLERANCE, ALL OTHERS ARE ±5%
M.S.D
M.S.D'
L.S.D'
L.S.D.
F SEGMENT
A
B
E
G
D
C
BLANK DEC. 4
DRIVE DEC. 3
DEC. PT. (3RD DIGIT)
DEC. PT. (4TH)
LIN. DR.
DIST. DR.
LOG. DR.
'C' MESS. DR.
3 kHz DR.
15 kHz DR.
PR. DR.
NOISE DR.
GEN. LEVEL DR.
J6 (DISPLAY CONN.)
J5
J5 (STRAP BD. CONN.)
CONSULTRONICS LTD.
TORONTO, CANADA.
COUNTER P.C.B - SCHEMATIC
MODEL #302 & #306
MATL 400021-2 P.C.B.
DRN BY L.R.
DATE FEB 11, 1974
DWG NO 110012-2S



CONSULTRONICS LTD. TORONTO, CANADA.	COUNTER P.C.B. – BLOCK SCHEMATIC MODEL # 302 & 306	DR'N BY L.R.	SCALE —
		CH'D BY L.R.	DWG. No. 110012-1B
	MAT'L / No. REQ'D / CLASS	DATE JAN 31, 1974	

TRANSTEX 15 10M-9-73



COMPONENT SIDE

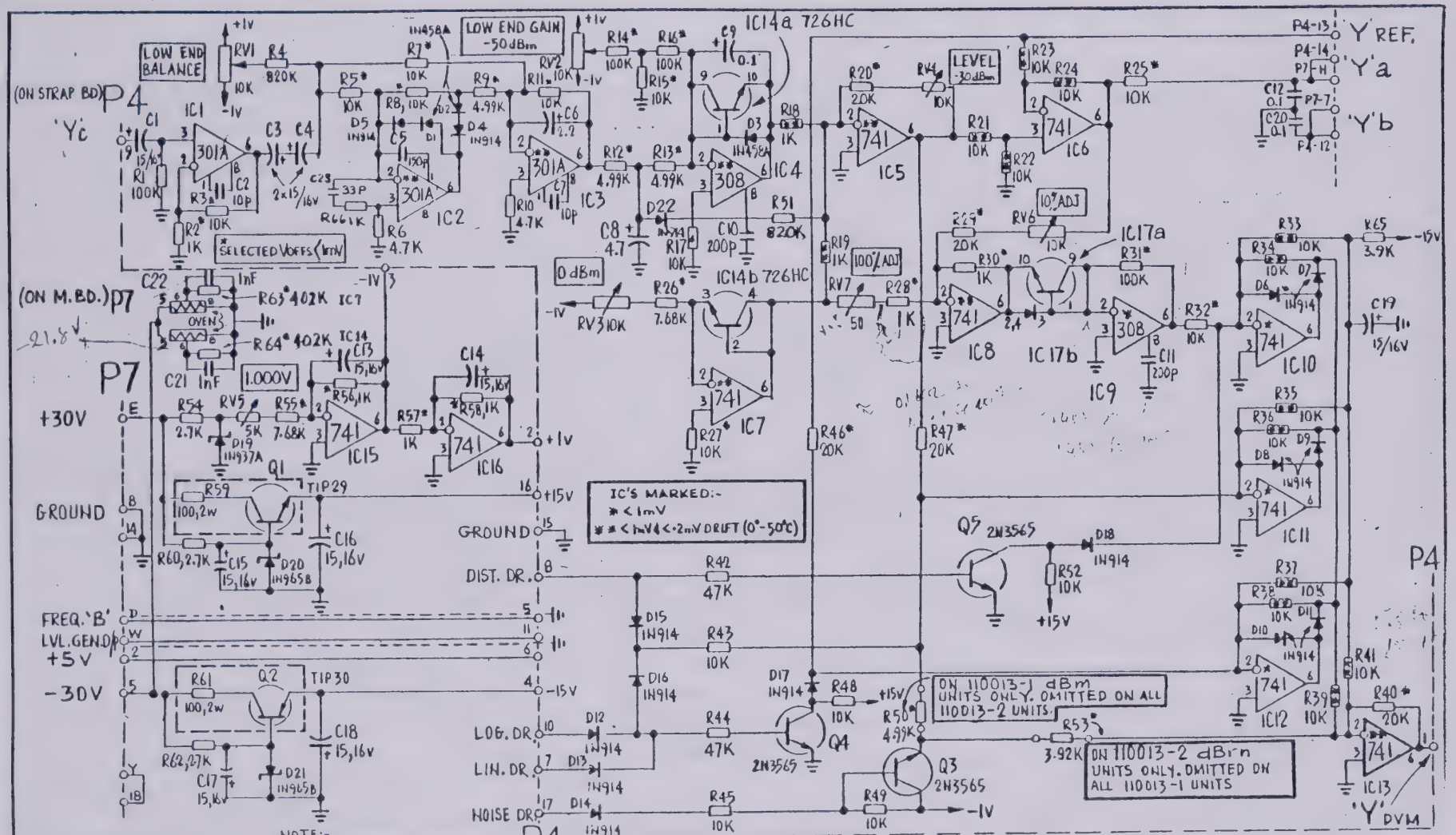
CUT PINS ON J5 & J6 TO APPROX. 1/16" HIGH OFF P.C.B.

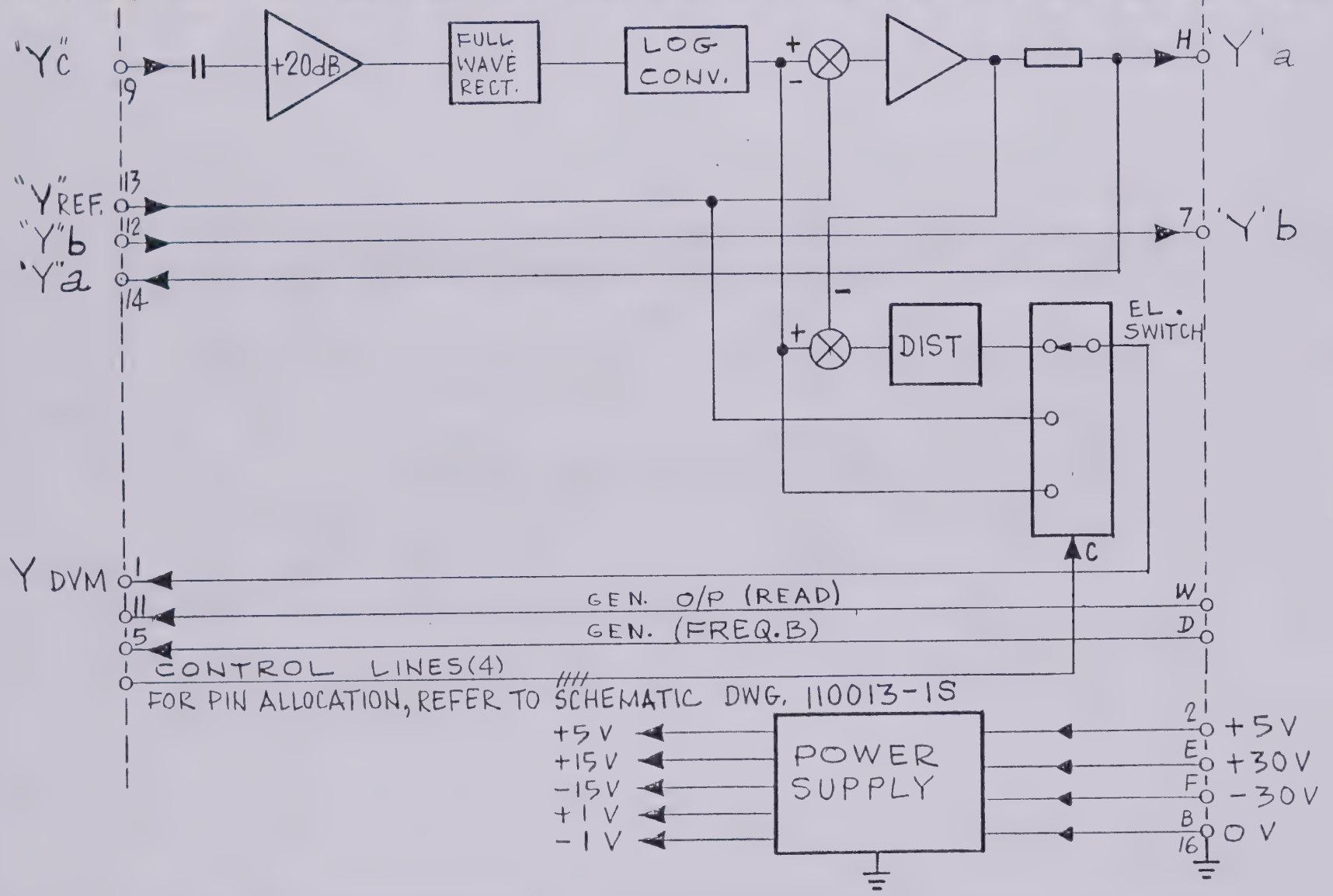
NOTE:-

1. IC's 10,11,12 ARE SELECTED * < 1mV OFFSET.
2.
3. RESISTORS MARKED * ARE ± 1% TOL.
4. " " ** " SELECTED ± 0.1% TOL.
5. CAPACITORS MARKED * (C6,7) ARE POLYSTYRENE.
6. JUMPERS W1 & W2 USED FOR 1 Hz RESOLUTION ONLY.
7. X'TAL TO BE LAID ON P.C.B. AS SHOWN AND PINS SOLDERED TO PADS AS SHOWN. USE DOUBLE FACED TAPE TO HOLD DOWN ON PCB.
8. RESISTOR VALUES INDICATE COLOR CODE EQUIVALENT.

REV	DESCRIPTION	DATE
A	NO ARTWORK CHANGE PROD. IMPROVEMENT CHANGES	LR MAR 78

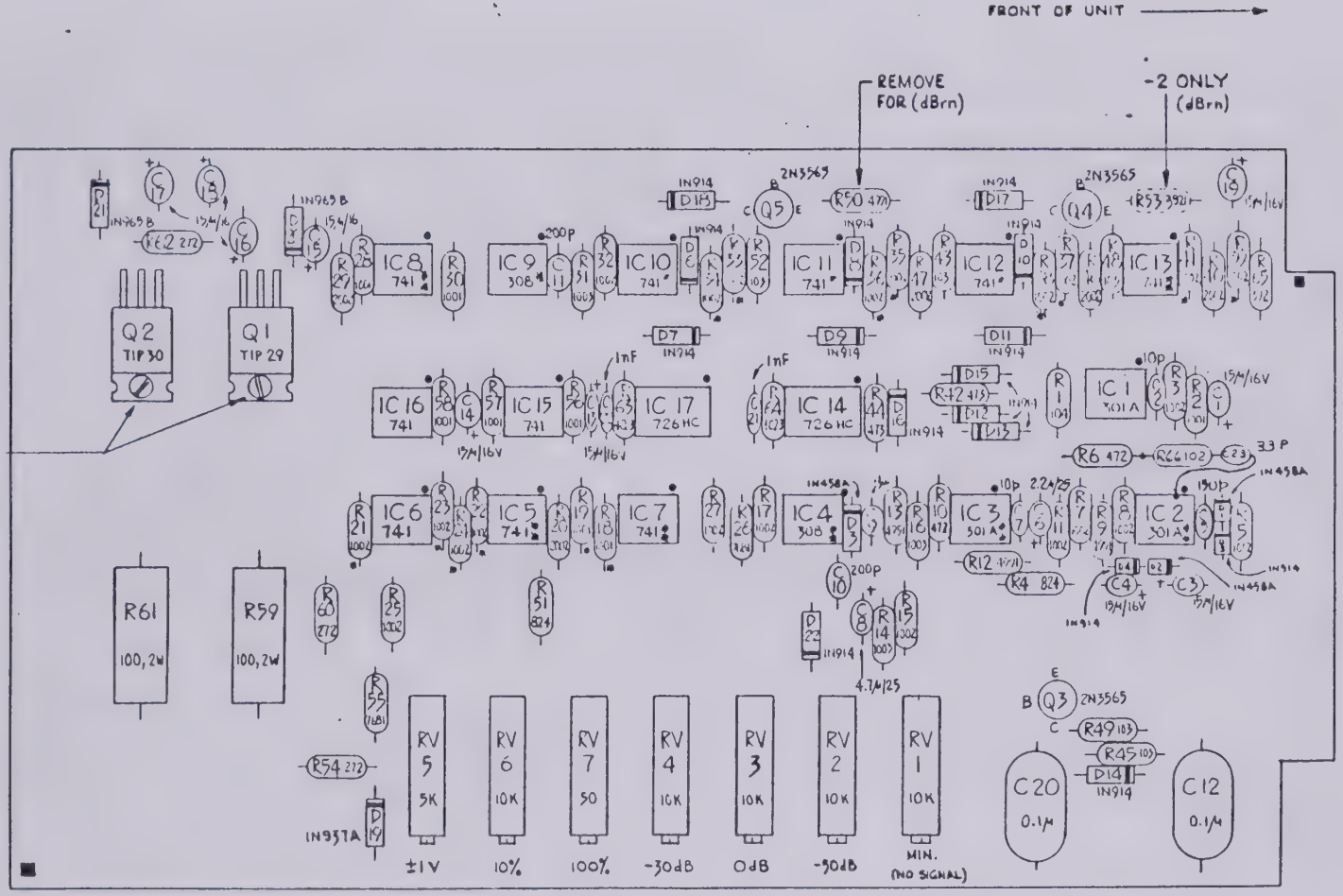
CONSULTRONICS LTD TORONTO, CANADA.	COUNTER P.C.B. S/ASSY. SYSTEM 300, (302 & 306)	DRAWN BY LR
	MAT'L PCB 400221-2	SCALE 2:1
		CH'D BY
		DATE NOV. 23, 77
		DWG NO. 110012-2


LOW END BALANCE
LOW END GAIN -50dBm
LEVEL -30dBm
0 dBm
100% ADJ
10% ADJ
SELECTED VOFFS (1mV)
1.000V
OVEN
(ON STRAP BD) P4
'Yc
(ON M.B.D.) P7
P7
+30V
GROUND
FREQ.'B'
LVL.GEN.
+5V
-30V
-1V
+1V
+15V
-15V
DIST. DR.
LOG. DR.
LIN. DR.
NOISE DR.
'Y' REF.
'Y'a
'Y'b
'Y' DVM
IC1
IC2
IC3
IC4
IC5
IC6
IC7
IC8
IC9
IC10
IC11
IC12
IC13
IC14a 726HC
IC14b 726HC
IC15
IC16
IC17a
IC17b
Q1 TIP29
Q2 TIP30
Q3 2N3565
Q4 2N3565
Q5 2N3565
IC'S MARKED:-
* < 1mV
** < 1mV & < 2mV DRIFT (0°-50°C)
ON 110013-1 dBm UNITS ONLY. OMITTED ON ALL 110013-2 UNITS.
ON 110013-2 dBm UNITS ONLY. OMITTED ON ALL 110013-1 UNITS
RESISTORS MARKED * * ARE .1%
HIGHEST COMPONENT
R 66 | C 23 | D 22 | Q 5 | RV 7 | IC 17
NOTE:-
1. UNLESS OTHERWISE SPECIFIED ALL CAPACITANCES IN MICROFARAD. ALL RESISTANCES IN OHM.
2. ALL ICs - PIN 4 TO -15V, PIN 7 TO +15V.
3. RESISTORS MARKED * ARE 1% ALL OTHERS ARE 5%
CONSULTRONICS LTD. TORONTO, CANADA
'Y' P.C.BOARD — SCHEMATIC
MODEL # 302
MATL 400023-1 P.C.B
CLASS E/APR.77
DATE FEB 22, 1974
DRN BY LR
CHK'D BY J.R.
SCALE —
DWG No. 110013-1S,2S



CONSULTRONICS LTD. TORONTO, CANADA	"Y" P.C.B. – BLOCK SCHEMATIC MODEL #302	DR'N BY L R	SCALE —
		CH'D BY J. R.	DWG. No. 110013-1B
	MAT'L / No. REQ'D / CLASS	DATE JAN 31, 1974	

TRANSTEX 13 10M-9-73



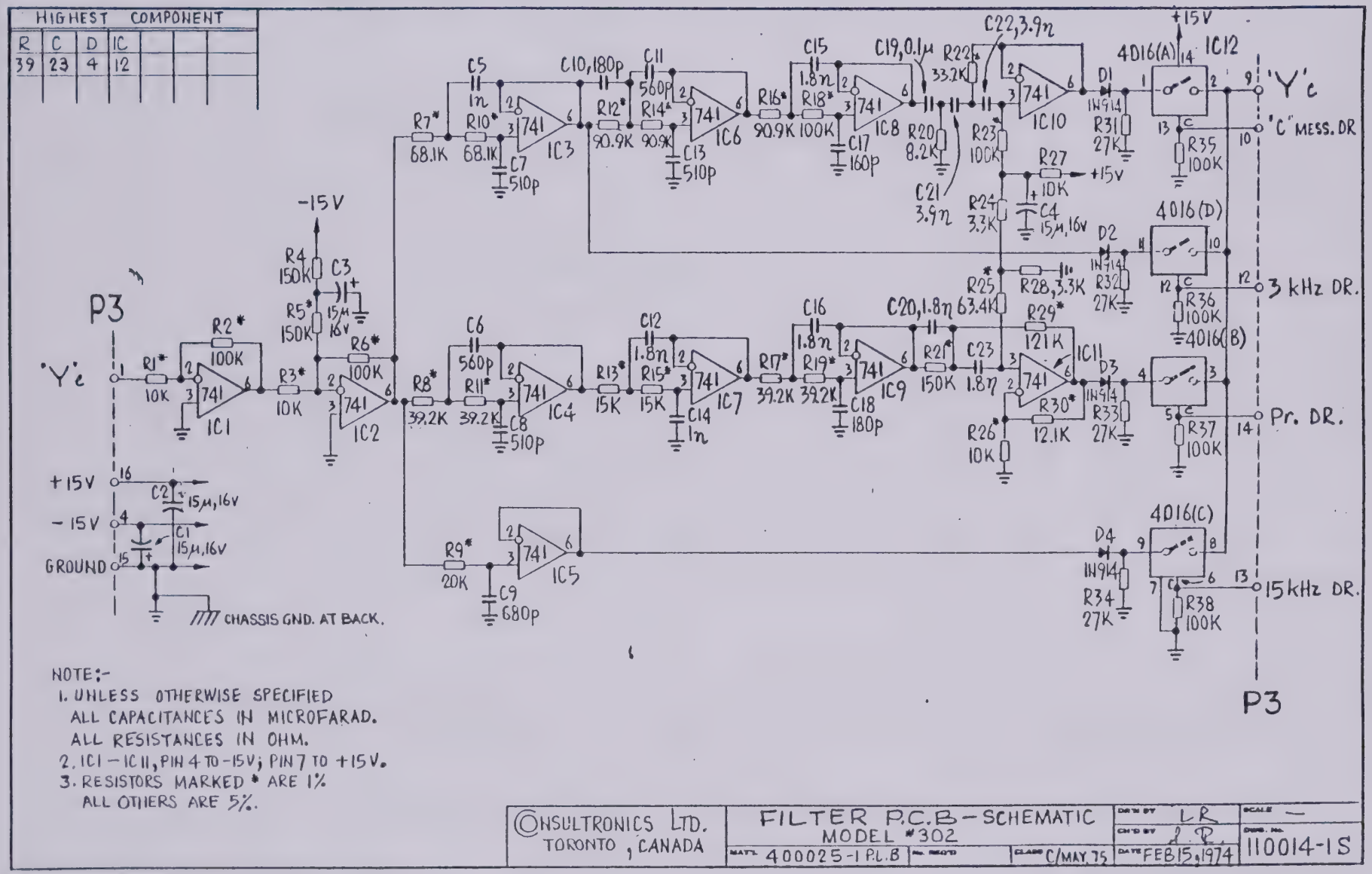
RESISTOR VALUES INDICATE COLOUR CODE EQUIV.

COAT SURROUNDINGS OF IC 2,3,4,7,9,14,17 ON BOTH SIDES OF P.C.B WITH SILICON RESIN, TECH SPRAY #1645-6S OR EQUIVALENT.

IC'S 2,3,4,5,7,10,11,12 & 13 ARE SELECTED, * < 1mV, ** < 1mV & < 0·2mV DRIFT (0°-50°)

RESISTORS MARKED * ARE ·1% SELECTED TYPE

CONSULTRONICS LTD. TORONTO, CANADA	'Y' P.C.B. SUB. ASSY. MODEL 302	DR'N BY RR	SCALE 2:1
	MATL 400023-1	CLASS E/APR 77	DATE APR 23 1975
			DWG No. 110013-1

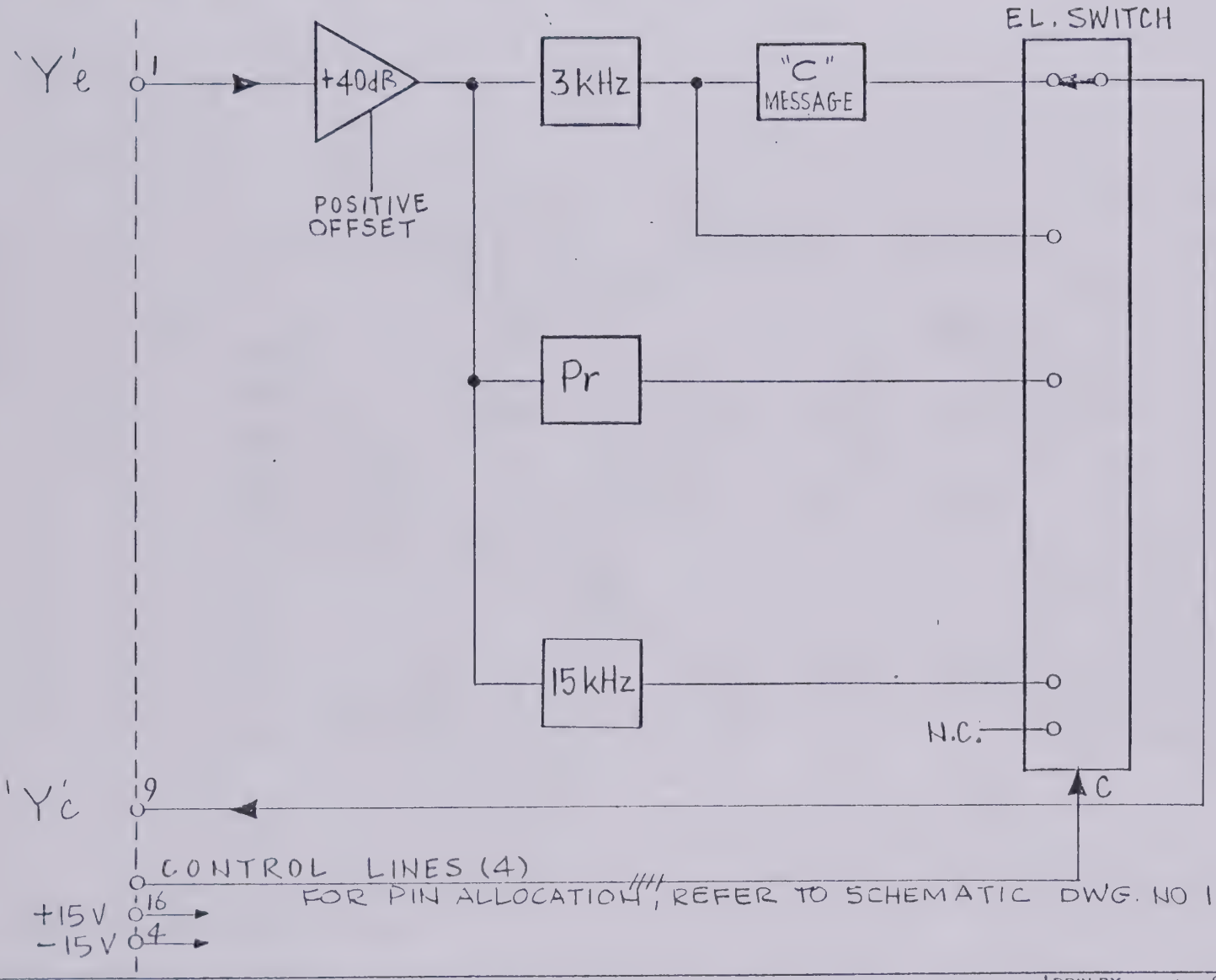


NOTE:-

1. UNLESS OTHERWISE SPECIFIED
   ALL CAPACITANCES IN MICROFARAD.
   ALL RESISTANCES IN OHM.
2. IC1 – IC11, PIN 4 TO -15V; PIN 7 TO +15V.
3. RESISTORS MARKED * ARE 1%
   ALL OTHERS ARE 5%.

CONSULTRONICS LTD. TORONTO, CANADA	FILTER P.C.B – SCHEMATIC MODEL #302	DRN BY LR	SCALE —
		CH'D BY	DWG. NO. 110014-1S
	MATL 400025-1 P.C.B	CLASS C/MAY 75	DATE FEB 15, 1974

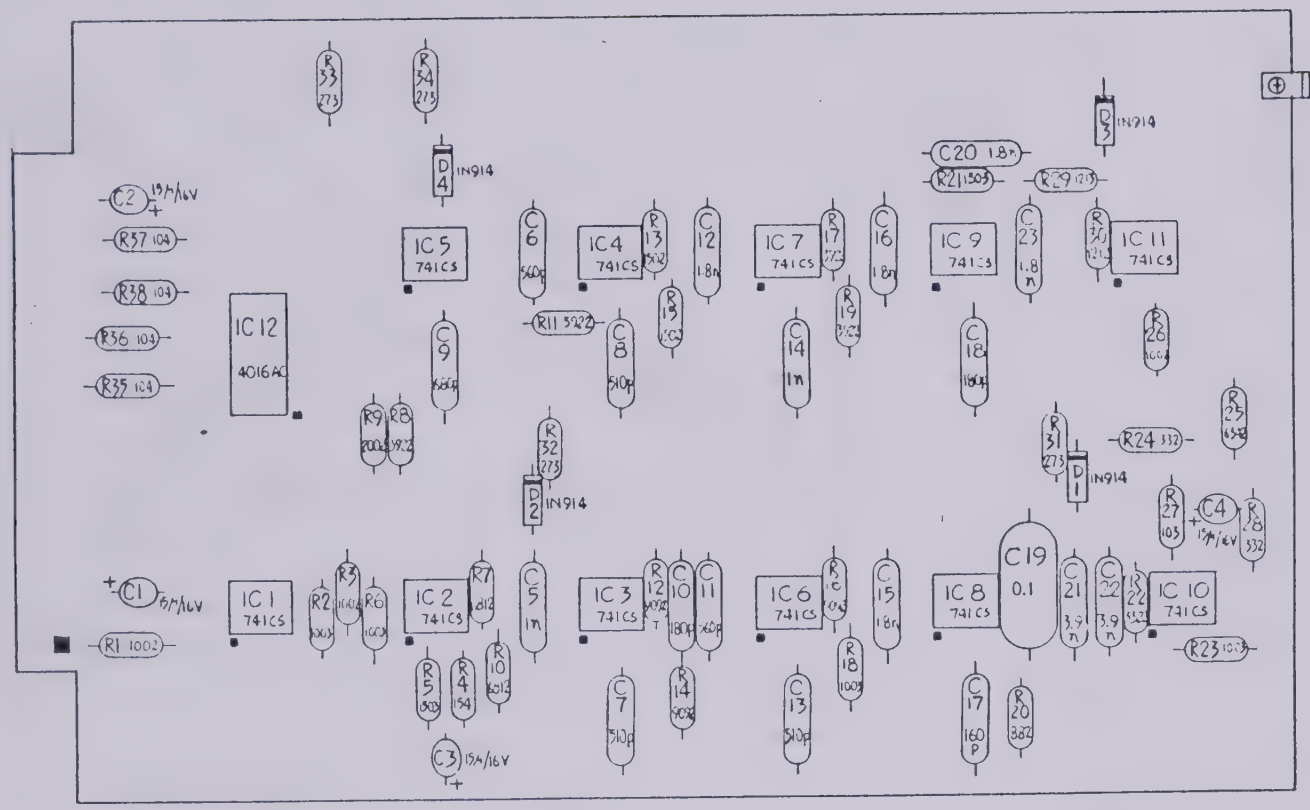
P3



CONSULTRONICS LTD. TORONTO, CANADA	FILTER P.C.B. — BLOCK SCHEMATIC MODEL #302	DR'N BY L.R.	SCALE —
		CH'D BY L.K.	DWG. No. 110014-1B
	MAT'L / No. REQ'D / CLASS	DATE JAN 31, 1974	

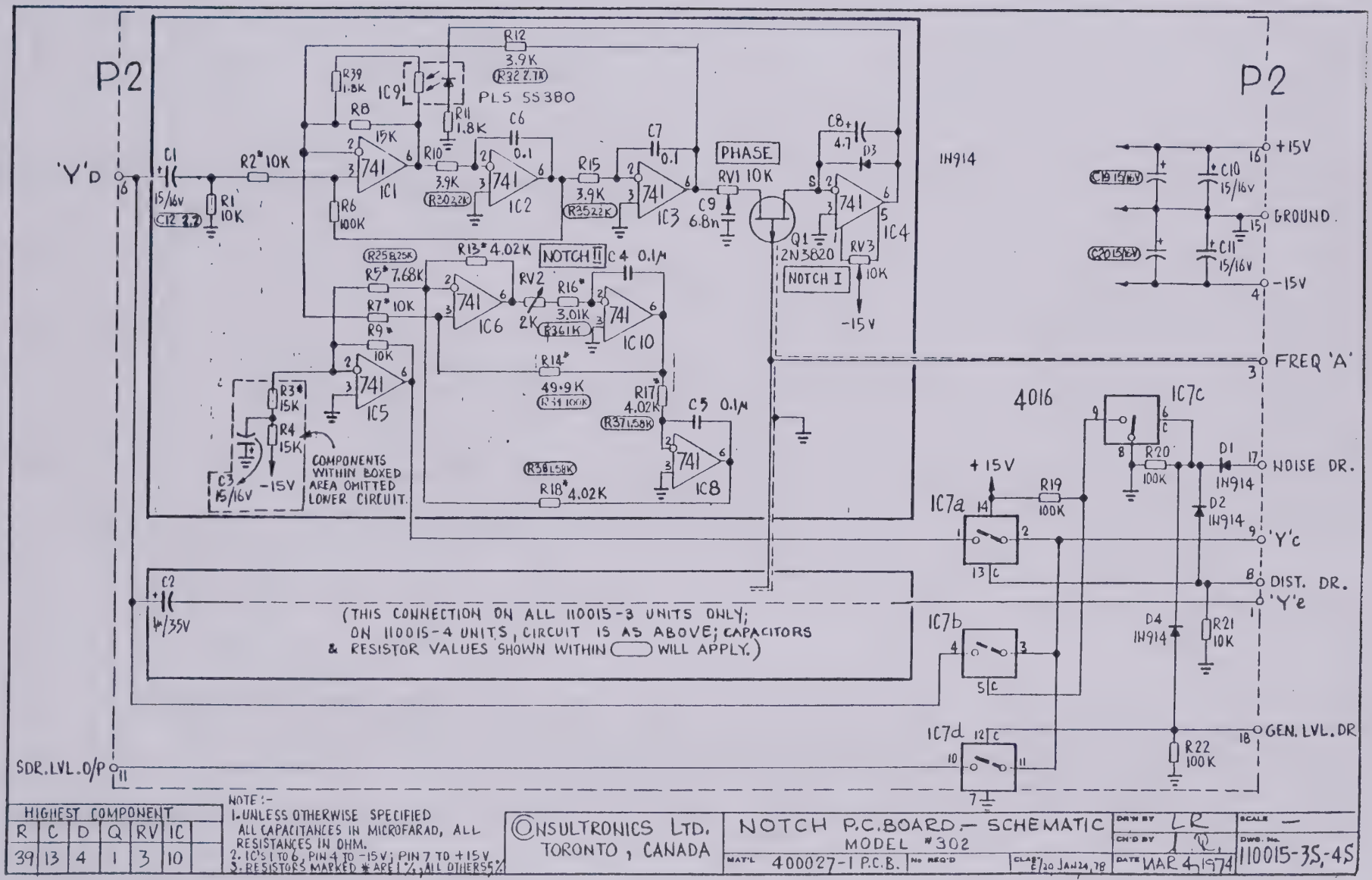
TRANSTEX 15 10M-9-73

FRONT OF UNIT



RESISTOR VALUES INDICATE COLOUR CODE EQUIV.

CONSULTRONICS LTD. TORONTO, CANADA.	FILTER BOARD P.C.B. ASSY. MODEL #302	DRN BY RR	SCALE 2:1
	DWG NO 400025-1	CHKD BY	DWG NO 110014-1
		CLASS C/MAY 75	DATE APR. 21. 1975



HIGHEST COMPONENT						
R	C	D	Q	RV	IC	
39	13	4	1	3	10	

NOTE :-
1. UNLESS OTHERWISE SPECIFIED ALL CAPACITANCES IN MICROFARAD, ALL RESISTANCES IN OHM.
2. IC'S 1 TO 6, PIN 4 TO -15V; PIN 7 TO +15V
3. RESISTORS MARKED * ARE 1%, ALL OTHERS 5%

CONSULTRONICS LTD. TORONTO, CANADA

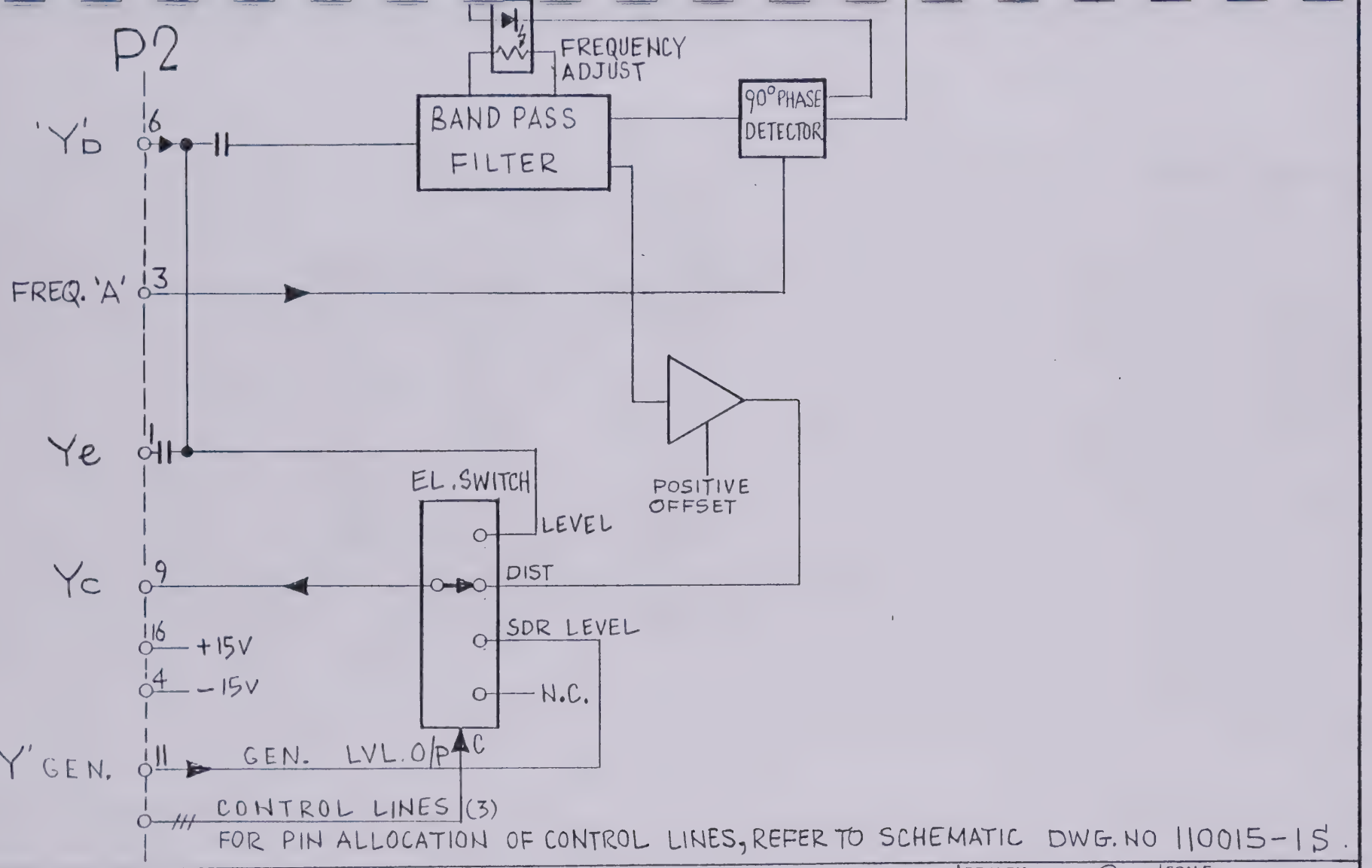
NOTCH P.C.BOARD — SCHEMATIC
MODEL #302

MAT'L 400027-1 P.C.B. | No REQ'D | CLASS E/30 JAN 24, 78

DR'N BY LR | CH'D BY | DATE MAR 4 1974

SCALE — | DWG. No. 110015-3S, -4S

TRANSTEX 15 10M 0-73

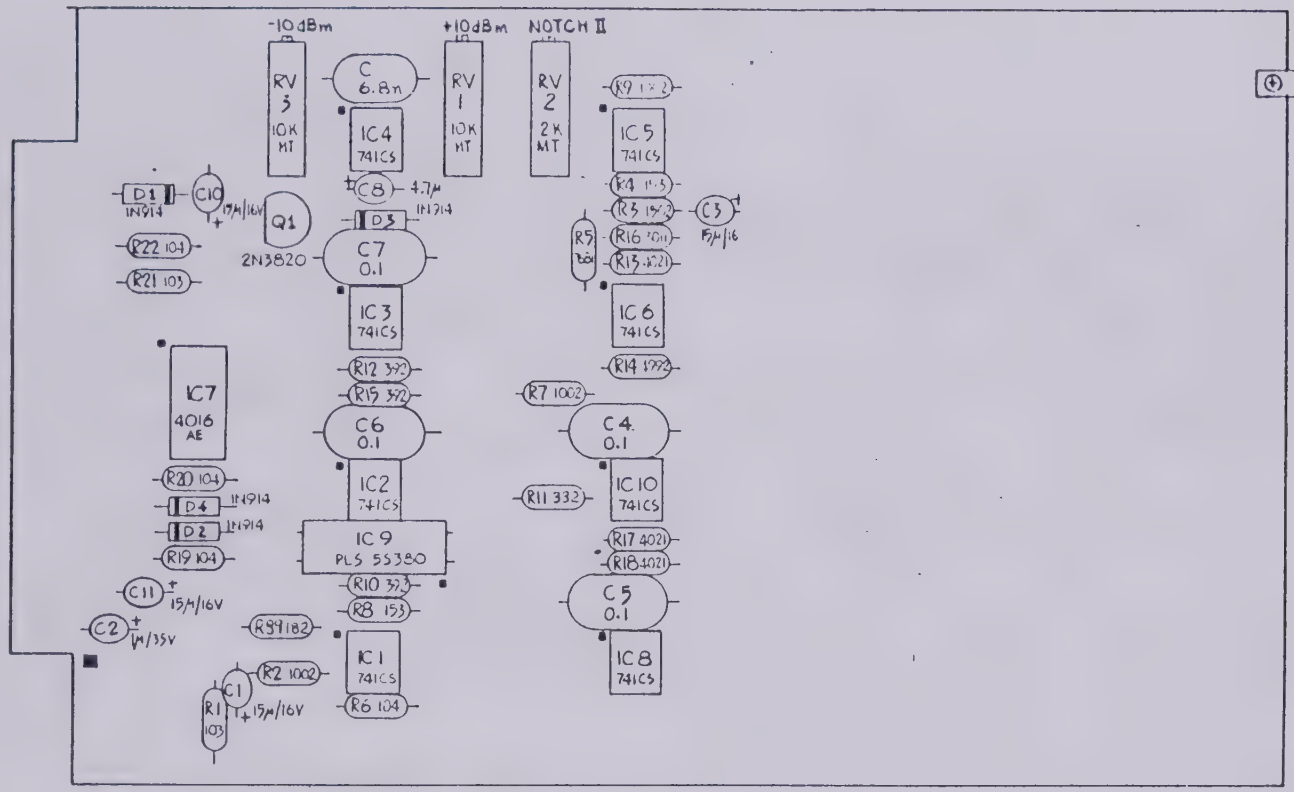


FOR PIN ALLOCATION OF CONTROL LINES, REFER TO SCHEMATIC DWG. NO 110015-1S.

CONSULTRONICS LTD TORONTO CANADA	NOTCH P.C.B. — BLOCK SCHEMATIC MODEL #302	DR'N BY L.R.	SCALE —
		CH'D BY J.K.	DWG. No. 110015-1B
	MAT'L / No. REQ'D / CLASS	DATE FEB 1, 1974	

TRANSTEX 15 10M-9-73

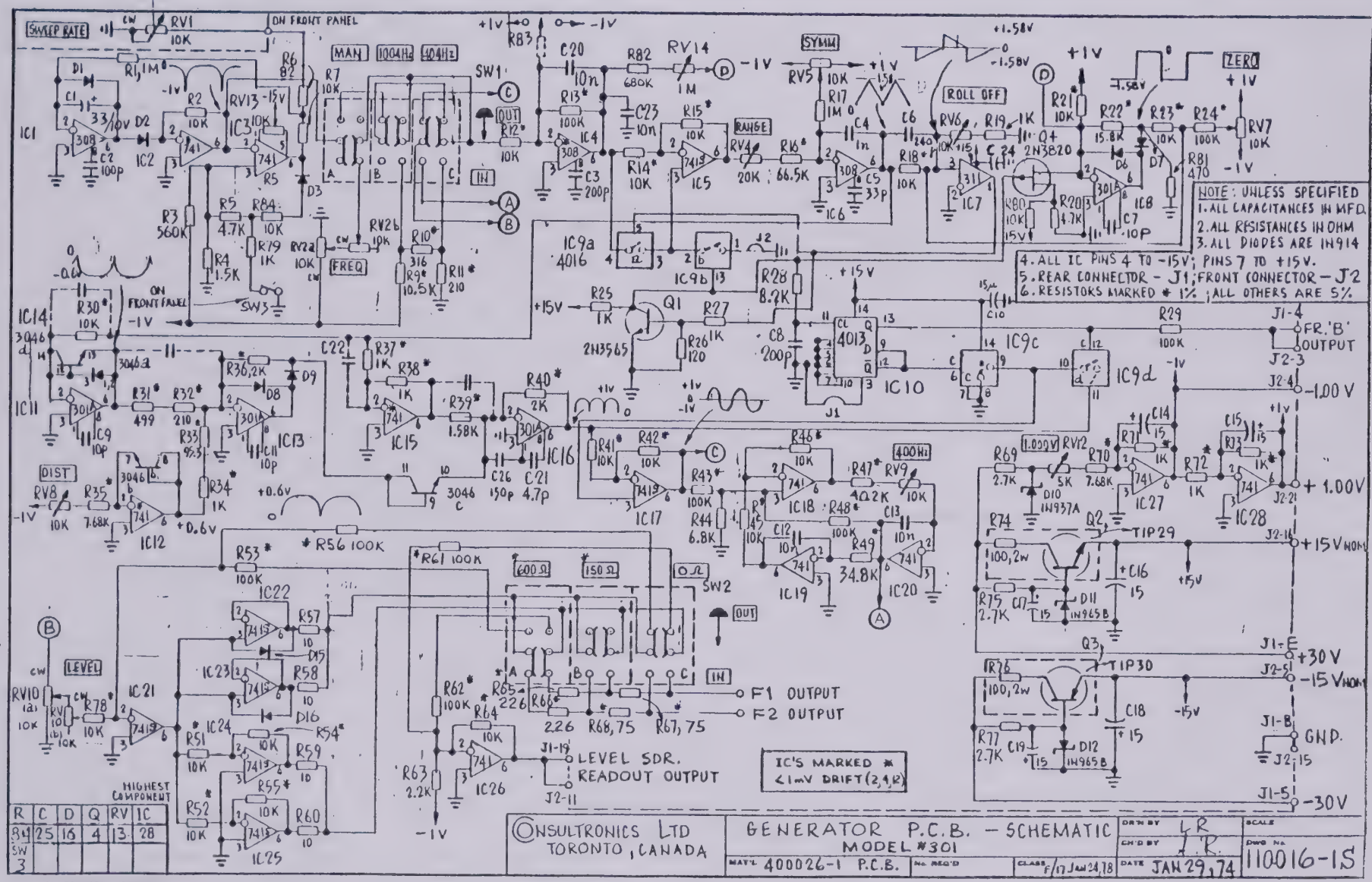
DISTORTION NOTCH

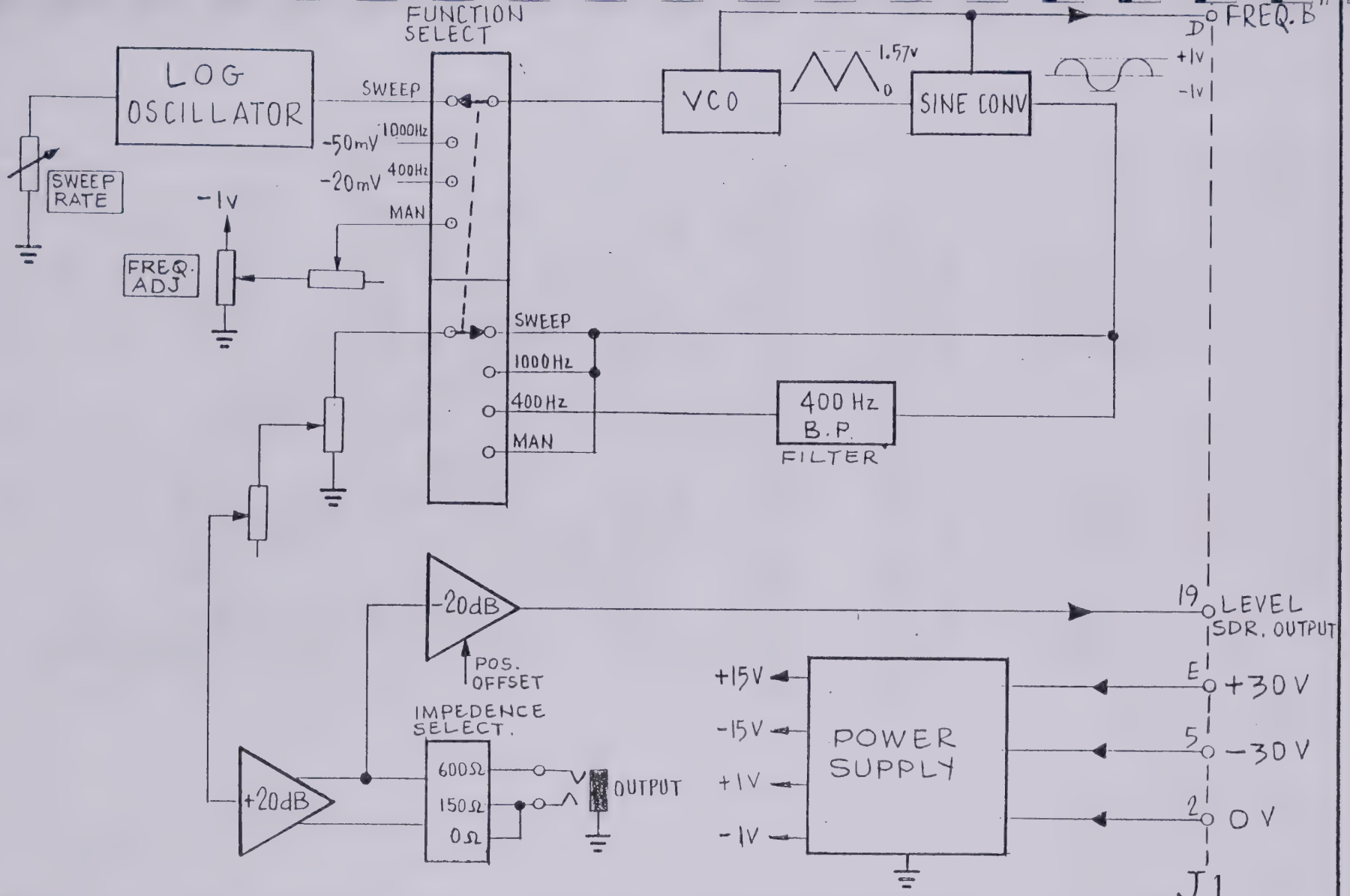


COMPONENT SIDE

RESISTOR VALUES INDICATE COLOUR CODE EQUIV.

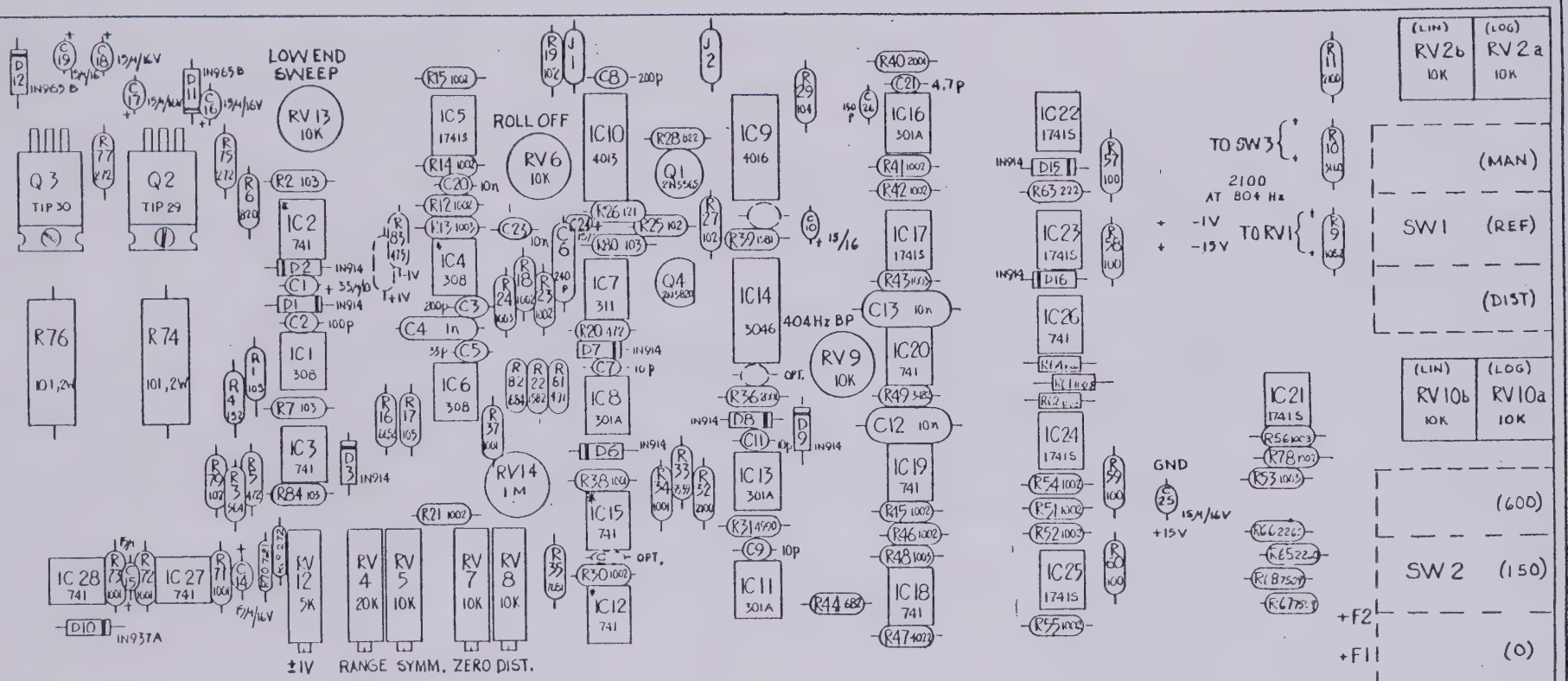
CONSULTRONICS LTD. TORONTO, CANADA.	NOTCH BOARD — P.C.B. ASSY. MODEL #302	DRN BY P.T / CHKD BY J.R.	SCALE 2:1
	DATE 400027-1	CLASS [illegible] 77	DATE APRIL 16, 1975
			110015-3


SWEEP RATE
RV1
10K
ON FRONT PANEL
MAN
100Hz
400Hz
SW1
SYMM
ROLL OFF
RANGE
ZERO
FREQ
LEVEL
DIST
IC1
IC2
IC3
IC4
IC5
IC6
IC7
IC8
IC9a
IC9b
IC9c
IC9d
IC10
IC11
IC12
IC13
IC14
IC15
IC16
IC17
IC18
IC19
IC20
IC21
IC22
IC23
IC24
IC25
IC26
IC27
IC28
Q1
Q2
Q3
Q4
2N3820
2N3565
TIP29
TIP30
SW2
OUT
IN
F1 OUTPUT
F2 OUTPUT
LEVEL SDR. READOUT OUTPUT
FR. 'B' OUTPUT
-1.00 V
+1.00
+15V NOM
+30 V
-15V NOM
GND.
-30V
NOTE: UNLESS SPECIFIED
1. ALL CAPACITANCES IN MFD.
2. ALL RESISTANCES IN OHM
3. ALL DIODES ARE IN914
4. ALL IC PINS 4 TO -15V; PINS 7 TO +15V.
5. REAR CONNECTOR - J1; FRONT CONNECTOR - J2
6. RESISTORS MARKED * 1%; ALL OTHERS ARE 5%
IC'S MARKED * <1mV DRIFT (2,4,R)
HIGHEST COMPONENT
R 84
C 25
D 16
Q 4
RV 13
IC 28
SW 3
CONSULTRONICS LTD
TORONTO, CANADA
GENERATOR P.C.B. - SCHEMATIC
MODEL #301
MAT'L 400026-1 P.C.B.
DRN BY J.R.
CH'D BY J.R.
DATE JAN 29, 74
SCALE
DWG No. 110016-1S



CONSULTRONICS LTD. TORONTO, CANADA	GENERATOR UNIT — BLOCK SCHEMATIC AUDIO ANALYZER MODEL #301	DR'N BY LR	SCALE —
		CH'D BY	DWG. No. 110016-1B
	MAT'L / No. REQ'D / CLASS	DATE JAN 30, 1974	

TRANSTEX 15 10M-9-73



A

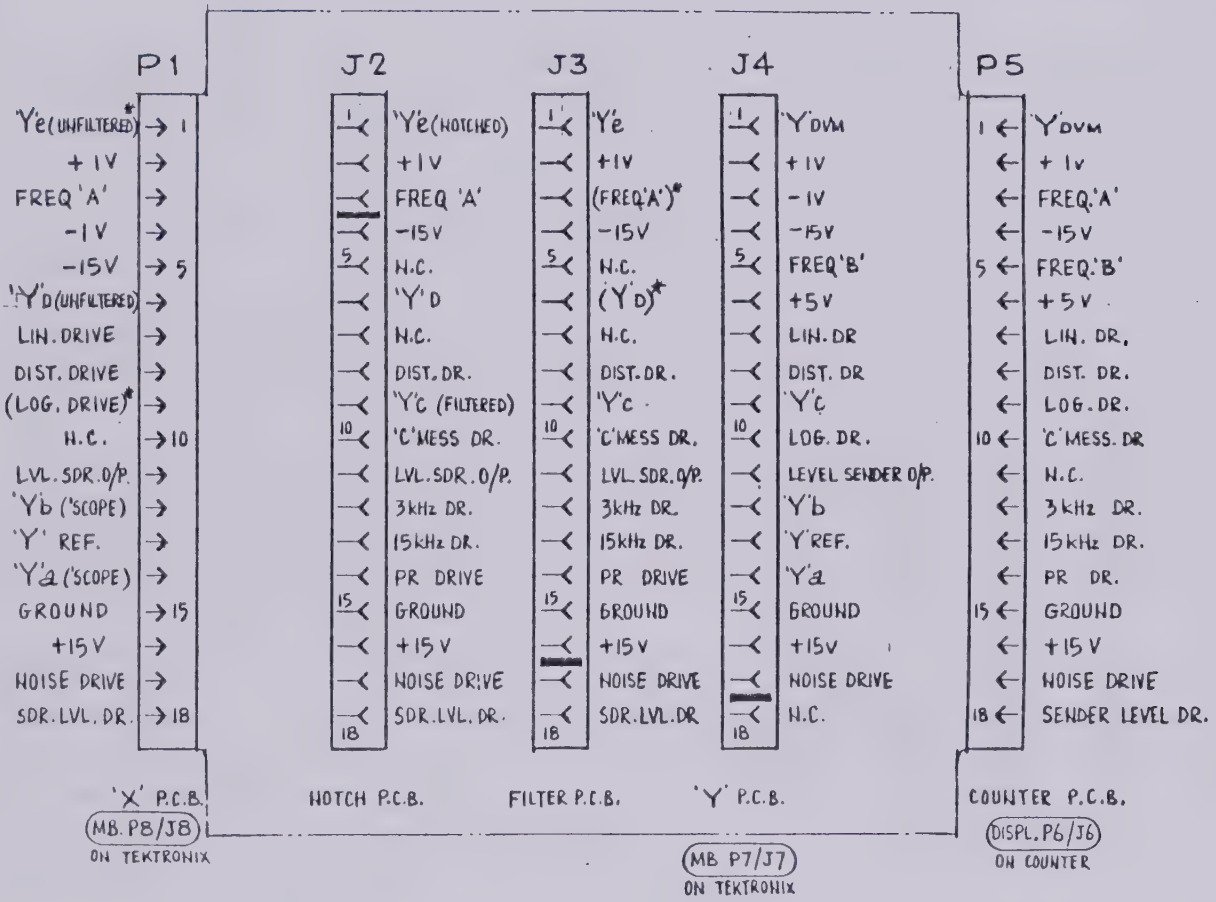
COMPONENT SIDE

FRONT OF UNIT ⟶

RESISTOR VALUES INDICATE COLOUR CODE EQUIV.

IC'S 2, 1, 12 ARE SELECTED @ <1mV DRIFT

CONSULTRONICS LTD. TORONTO, CANADA.	GENERATOR P.C.B. ASSY. MODEL # 301	DWN BY RR	SCALE 2:1
	MATL 400026-1	CHK'D BY JL	DWG. No. 110016-1
		DATE APR 30 1975	



NOTE:-
1. * INDICATE UNUSED, BUT INTERNALLY CONNECTED PINS.
2. ▬ • POLARIZING KEY + LOCATION

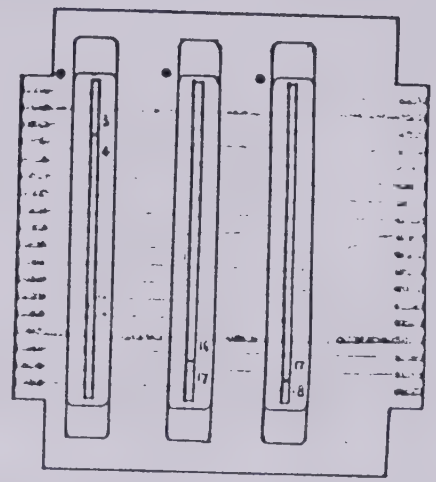
CONSULTRONICS LTD. TORONTO, CANADA	STRAP P.C.B. — SCHEMATIC MODEL #302	MAY 2.75 DR'N BY LR	SCALE —
	MATL 400022-1 P.C.B.	CH'D BY LR	DWG NO. 110017-1S
		DATE FEB. 7, 1974	

TRANSTEX IS 10M-6-73

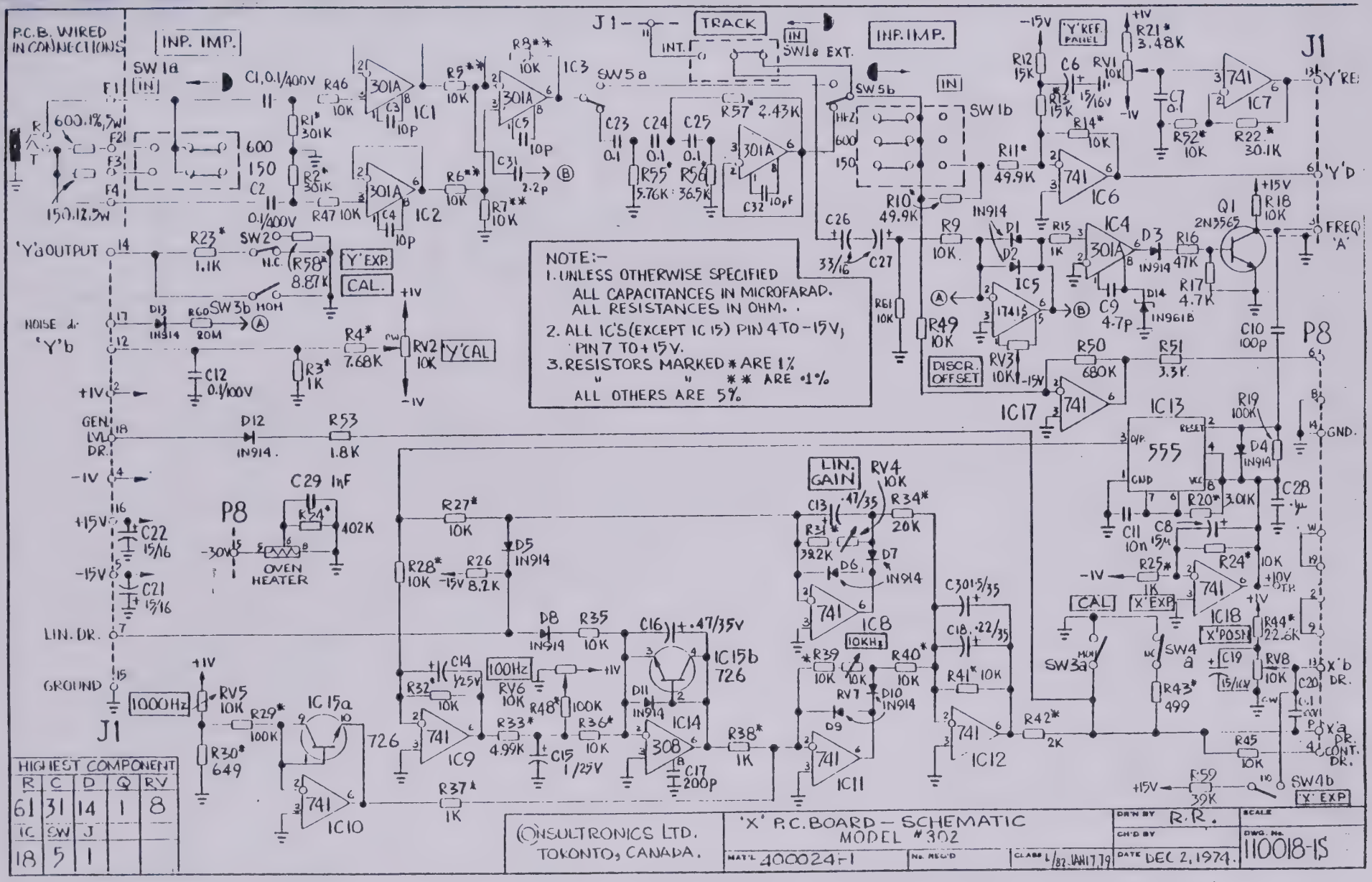
NOTE:-

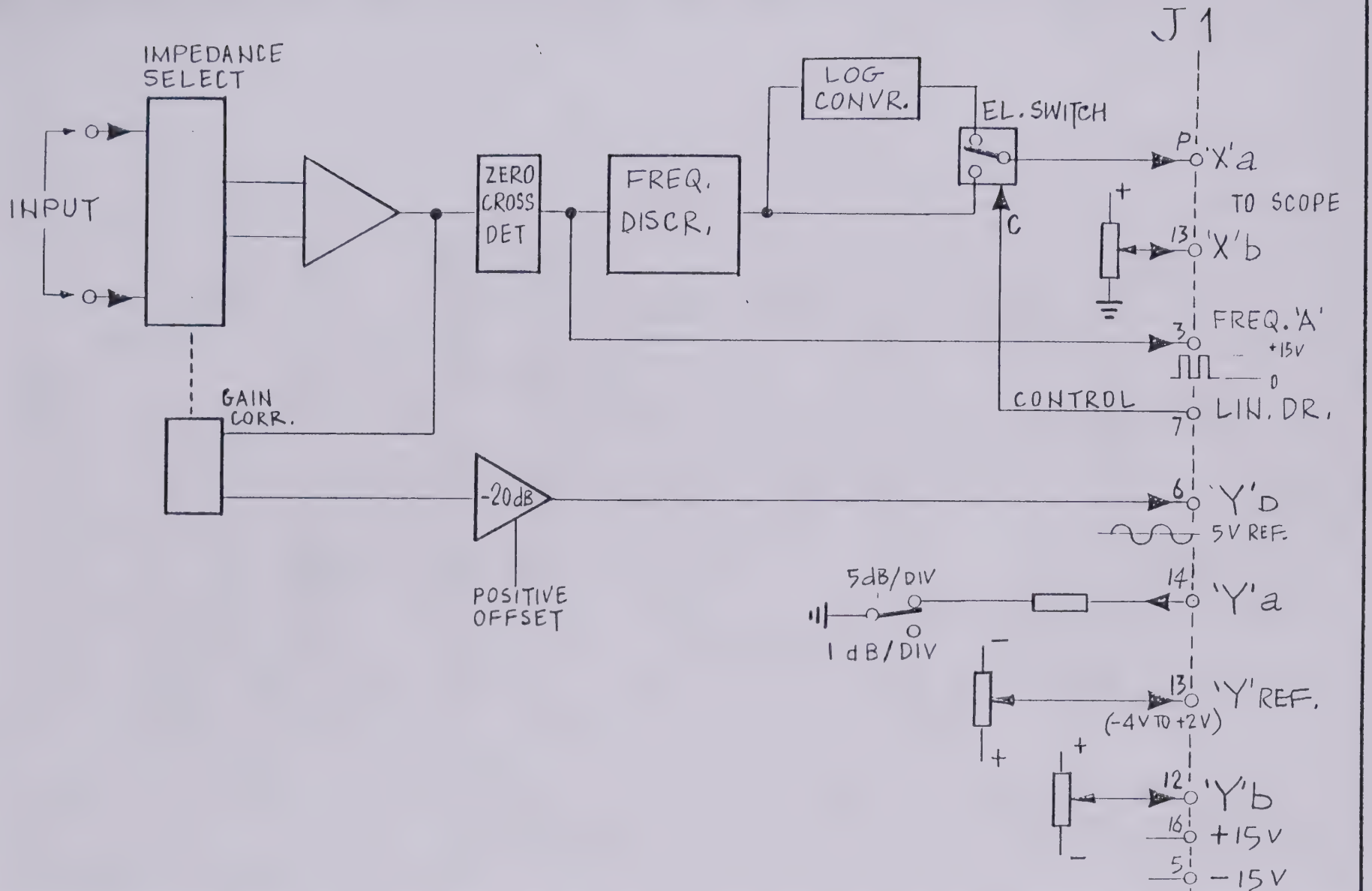
1. THREE CONNECTORS REQD ON THIS ASSEMBLY.

2. - SHOWS THE POSITION OF POLARISING KEYS



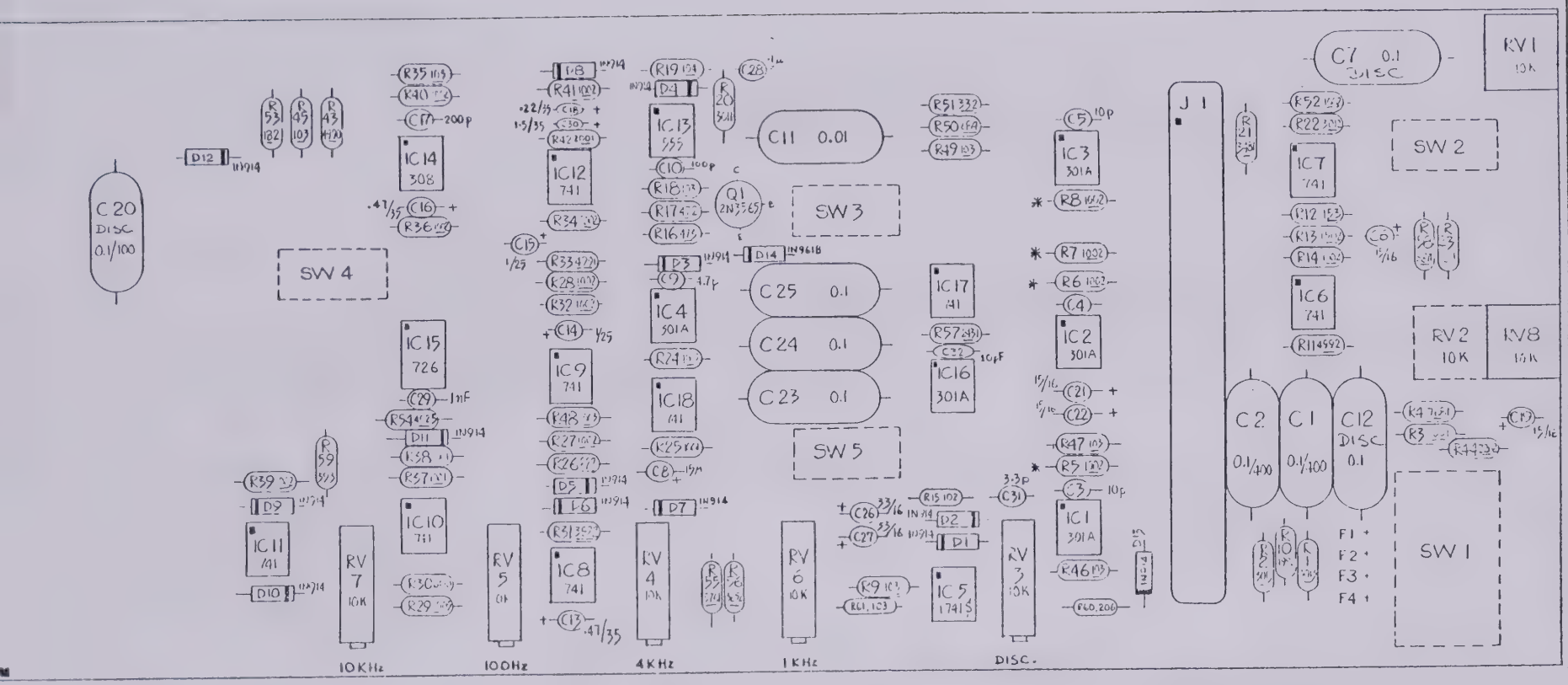
CONSULTRONICS LTD. TORONTO, ONTARIO	STRAP P.C.B. - ASSEMBLY MODEL 302		
	400022-1		110017-1


P.C.B. WIRED IN CONNECTIONS
INP. IMP.
SW1a
IN
C1, 0.1/400V
600
150
2
C2
0.1/400V
600.1%,5W
150.12.5W
R1* 301K
R2* 301K
R46 10K
R47 10K
IC1
IC2
IC3
301A
C3 10P
C4 10P
C5 10P
R5** 10K
R6** 10K
R7** 10K
R8** 10K
C31 2.2p
J1
TRACK
INT.
EXT.
SW1a
SW5a
SW5b
SW1b
INP. IMP.
C23 0.1
C24 0.1
C25 0.1
R55* 5.76K
R56* 36.5K
R57* 2.43K
C32 10pF
C26 33/16
C27
R10 49.9K
R61 10K
R49 10K
R9 10K
'Y' OUTPUT
R23* 1.1K
SW2
N.C.
R58* 8.87K
'Y' EXP
CAL.
SW3b
NOM
HOM
NOISE & 'Y'b
D13 IN914
R60 20M
C12 0.1/100V
R3* 1K
R4* 7.68K
RV2 10K
'Y' CAL
+1V
-1V
GEN LVL DR.
D12 IN914
R53 1.8K
C29 1nF
R24* 402K
P8
OVEN HEATER
-30V
+15V
-15V
C22 15/16
C21 15/16
LIN. DR.
GROUND
1000Hz
RV5 10K
R30* 649
R29* 100K
IC15a
726
IC10
R27* 10K
R28* 10K
R26 8.2K
D5 IN914
C14 1/25V
R32* 10K
100Hz
RV6 10K
R48* 100K
R33* 4.99K
C15 1/25V
R37* 1K
IC9
D8 IN914
R35 10K
C16 .47/35V
D11 IN914
IC15b 726
IC14
308
C17 200P
R38* 1K
LIN. GAIN
RV4 10K
C13 .47/35
R34* 20K
R31* 392K
D6
D7 IN914
IC8
10KHz
R39* 10K
R40* 10K
RV7 10K
D10 IN914
D9
IC11
C30 1.5/35
C18 .22/35
R41* 10K
IC12
R42* 2K
SW3a
CAL
X' EXP
SW4a
R43* 499
R45 10K
R59 39K
SW4b
X' EXP
X'b DR.
X'a DR.
CONT. DR.
'Y' REF. PANEL
R12 15K
R13* 15K
C6 15/16V
RV1 10K
R21* 3.48K
R14* 10K
R11* 49.9K
IC6
741
IC7
R52* 10K
R22* 30.1K
J1
'Y' REF
'Y' D
FREQ 'A'
Q1 2N3565
R18 10K
IC4
301A
D1 IN914
D2
R15 1K
D3 IN914
R16 47K
R17 4.7K
C9 4-7P
D14 IN961B
IC5
1741
R49 10K
RV3 10K
DISCR. OFFSET
R50 680K
R51 3.3K
IC17
C10 100P
P8
IC13
555
R19 100K
D4 IN914
C28
C11 10n
C8 15/16
R20* 3.01K
R24* 10K
R25* 1K
IC18
X' POSN
RV8 10K
C19 15/16V
C20 .1
GND
+10V TR.
R44* 22.6K
NOTE:-
1. UNLESS OTHERWISE SPECIFIED ALL CAPACITANCES IN MICROFARAD. ALL RESISTANCES IN OHM.
2. ALL IC'S (EXCEPT IC 15) PIN 4 TO -15V; PIN 7 TO +15V.
3. RESISTORS MARKED * ARE 1% " " ** ARE .1% ALL OTHERS ARE 5%.
HIGHEST COMPONENT
R 61
C 31
D 14
Q 1
RV 8
IC 18
SW 5
J 1
CONSULTRONICS LTD. TORONTO, CANADA.
'X' P.C. BOARD – SCHEMATIC MODEL #302
MAT'L 400024-1
No. REQ'D
CLASS L/82.1AN17.79
DRN BY R.R.
CH'D BY
DATE DEC 2, 1974.
SCALE
DWG. No. 110018-15



CONSULTRONICS LTD TORONTO CANADA	"X" P.C.B – BLOCK SCHEMATIC MODEL #302	DR'N BY L R	SCALE —
		CH'D BY I. R.	DWG. No. 110018-1B
	MAT'L / No. REQ'D / CLASS REV A JUNE/71	DATE FEB 1, 1974	

TRANSTEX 15 10M-9-73



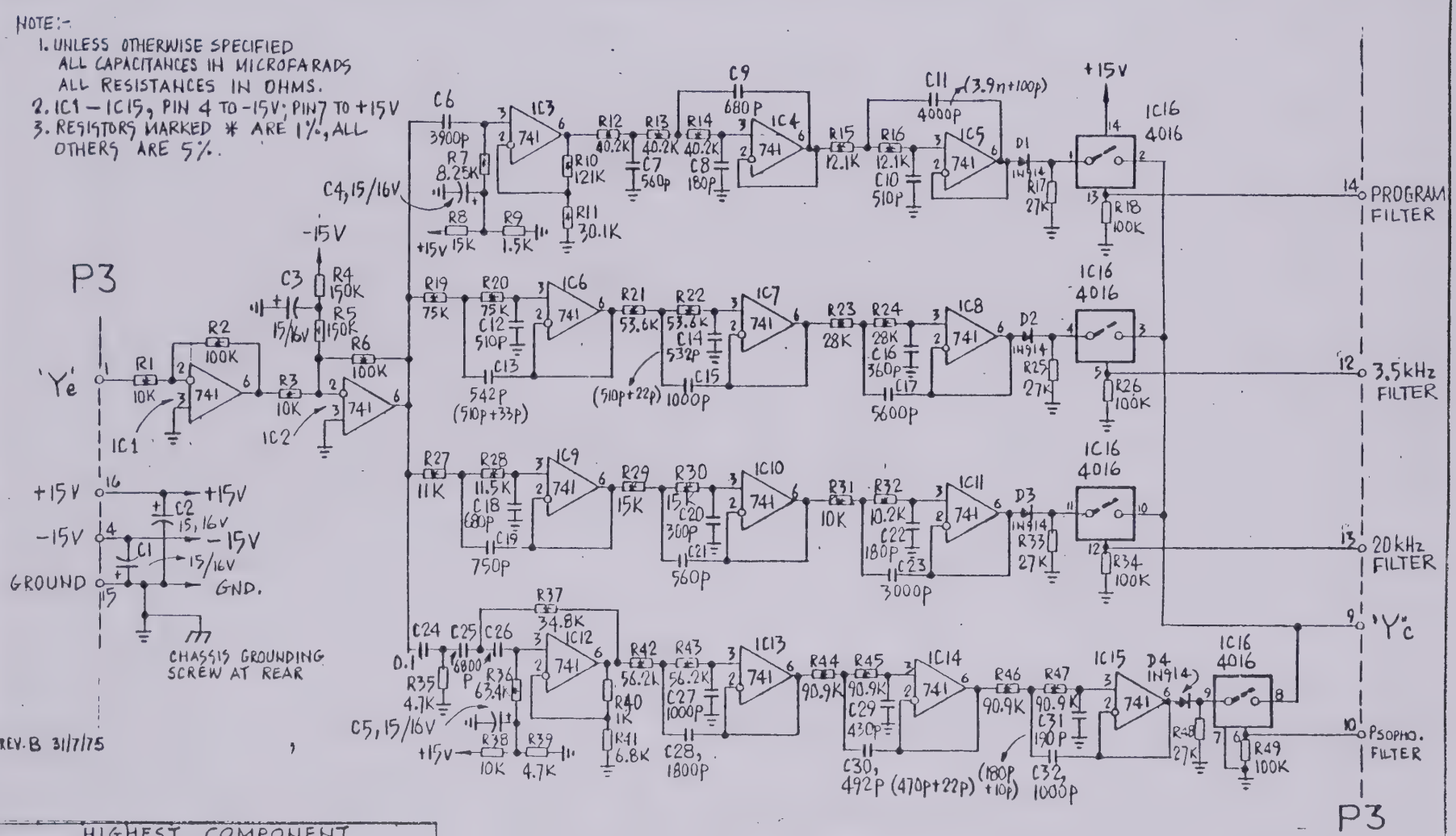
FRONT OF UNIT

COMPONENT SIDE

RESISTOR VALUES INDICATE COLOUR CODE EQUIV.

RESISTORS MARKED * ARE ±1% SELECTED TYPE.

CINEULTRONICS LTD.	X'P.C BOARD ASSY.	DRN BY	SCALE 2:1
		CH'D BY	DWG No. 117212-1



HIGHEST COMPONENT							
R	C	D	IC				
49	32	4	16				

CONSULTRONICS LTD
TORONTO, CANADA.

SCHEMATIC – CCITT FILTER P.C.B.
MODEL #302

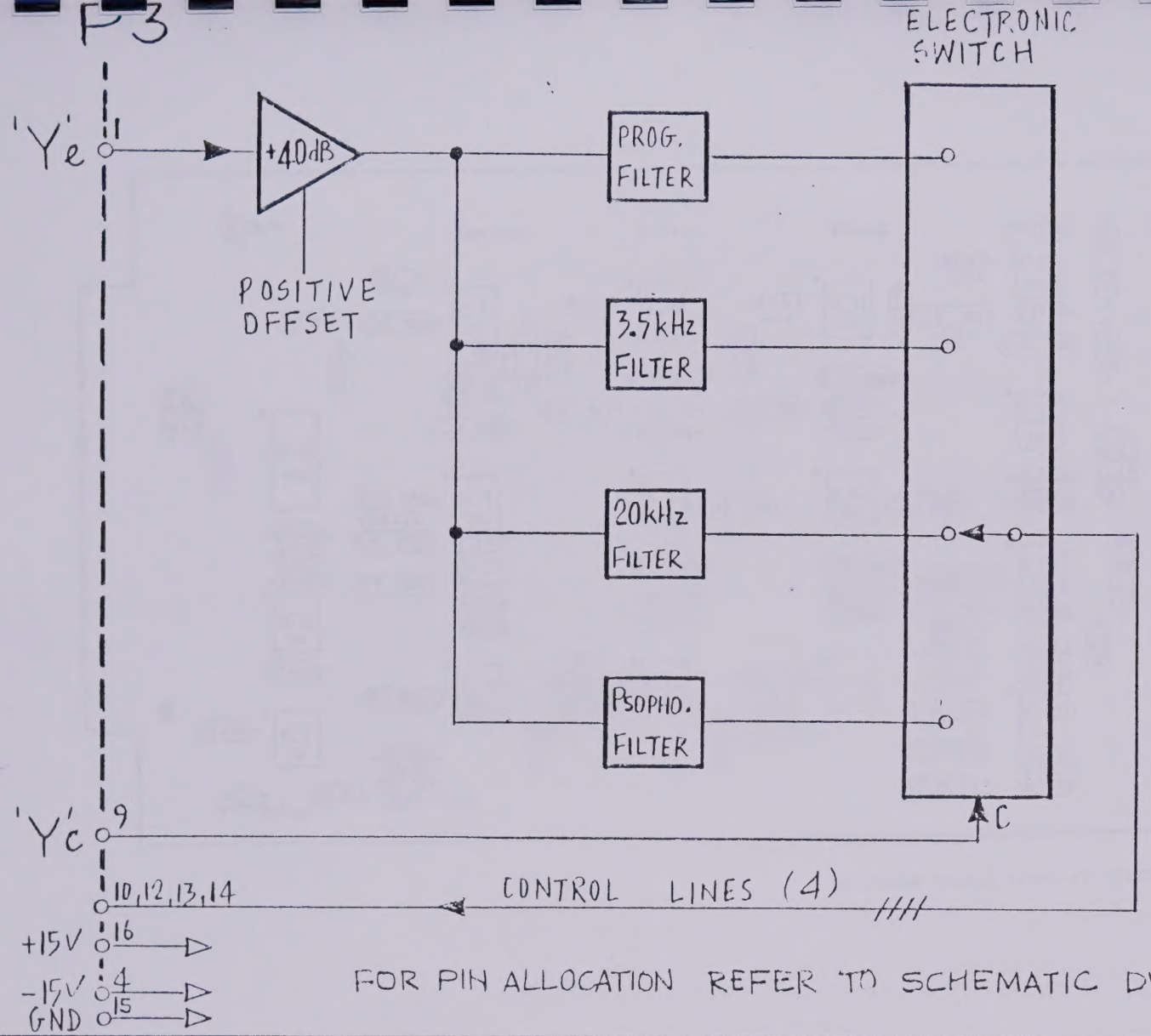
DRN BY KR
CH'D BY
DATE MAR. 20, '75

SCALE —
DWG. NO. 110047-1S

MATL | NO. REQ'D | CLASS

TRANSTEX 12 1004-0-73

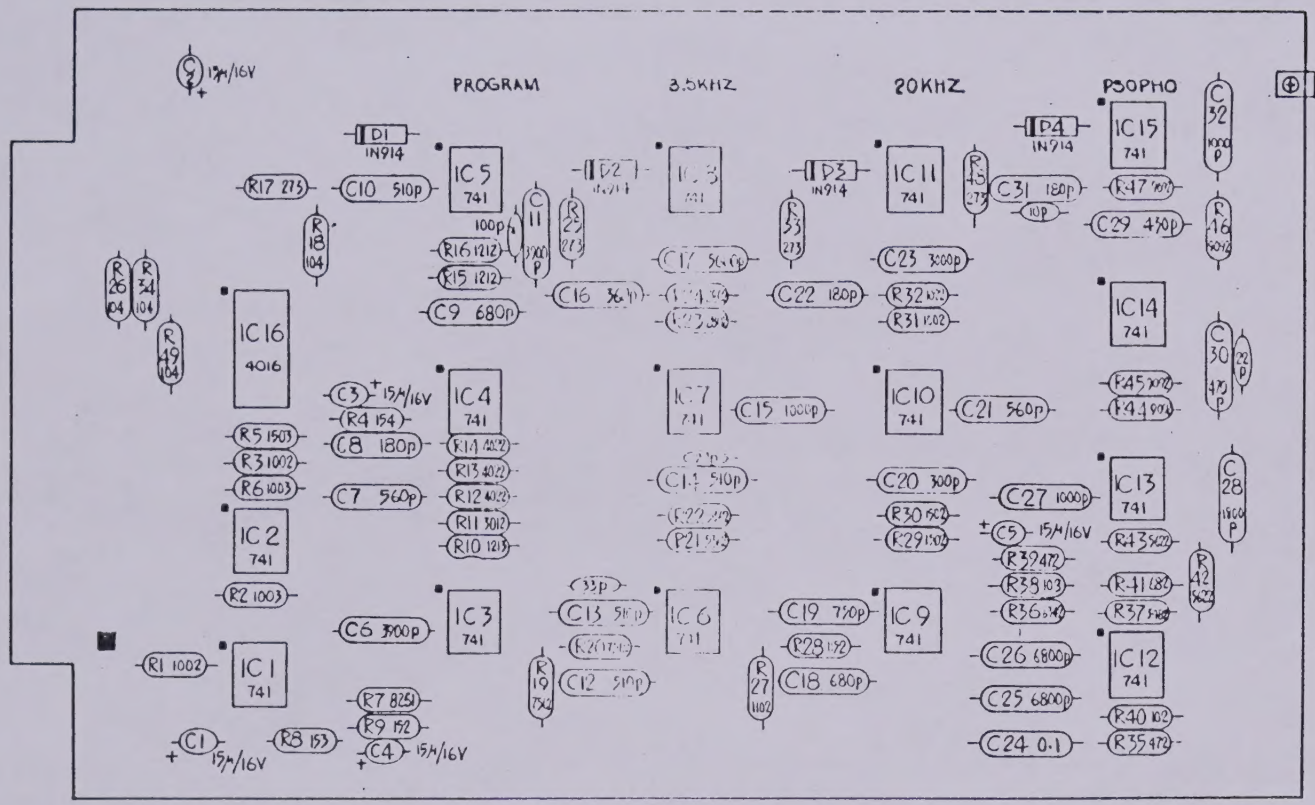
P3



FOR PIN ALLOCATION REFER TO SCHEMATIC DWG. NO. 110047-1S

CONSULTRONICS LTD, TORONTO, CANADA.	CCITT FILTER — BLOCK SCHEMATIC MODEL 302	DR'N BY LR	SCALE —
		CH'D BY A.R.	DWG. No. 110047-1B
	MAT'L / No. REQ'D / CLASS	DATE JUNE 14, 1977	

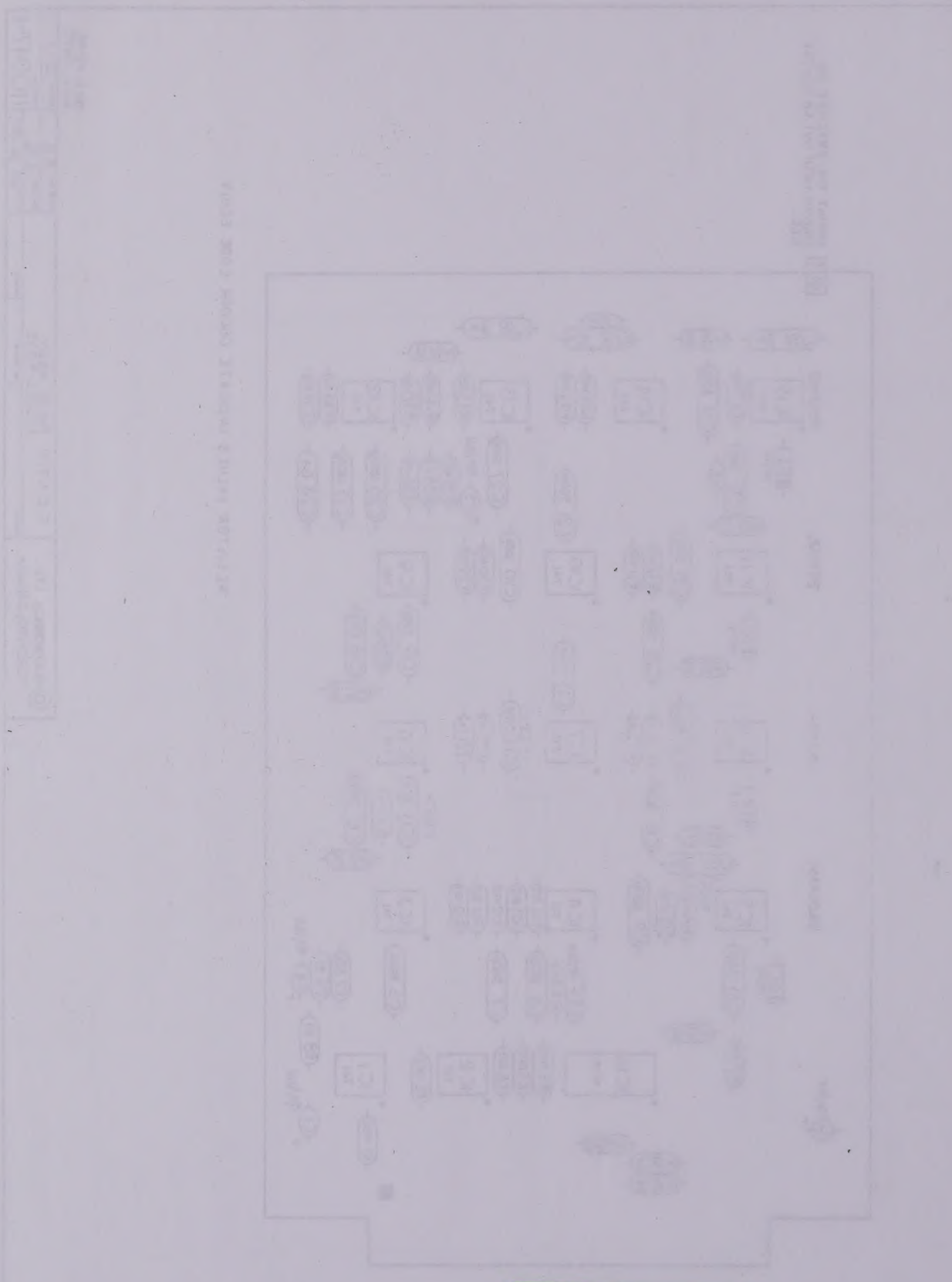
TRANSTEX 15 5M-11-74



RESISTOR VALUES INDICATE COLOUR CODE EQUIV.

REV. B. 31/7/75
REV. A. 3/6/75

CONSULTRONICS LTD. TORONTO, CANADA.	C.C.I.T.T. RC.B ASSY. MODEL # 302	DRN BY R.R. CH'D BY R.R. DATE APR. 30. 1975	SCALE 2:1 DWG. No. 110047-1
	MAT'L / No. REQ'D / CLASS		



MP MASTER
MA23471